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Popular Mechanics Magazine

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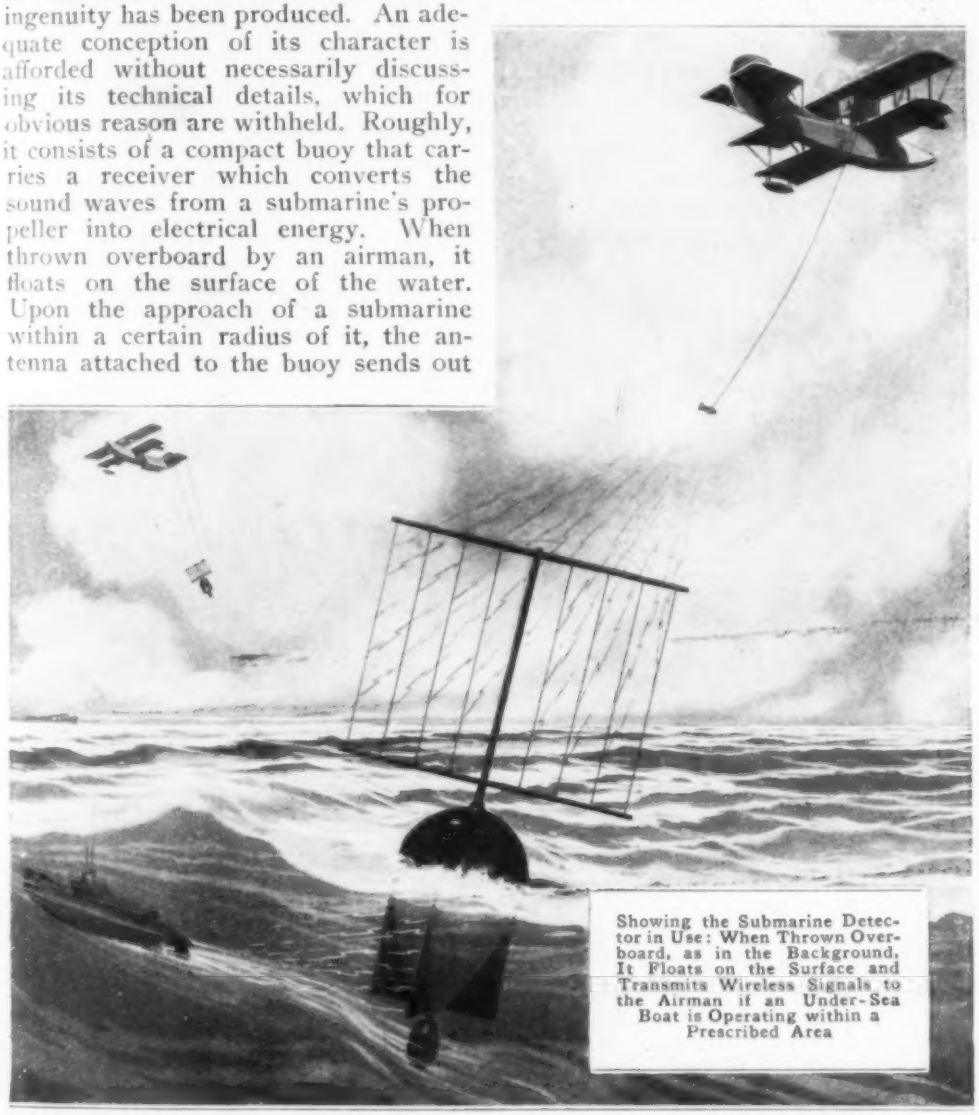
Vol. 28 DECEMBER, 1917 No. 6

Wireless System for Detection of U-Boats

TO assist naval airmen in detecting the presence, and then determining the position of enemy submarines, a delicate instrument of considerable ingenuity has been produced. An adequate conception of its character is afforded without necessarily discussing its technical details, which for obvious reason are withheld. Roughly, it consists of a compact buoy that carries a receiver which converts the sound waves from a submarine's propeller into electrical energy. When thrown overboard by an airman, it floats on the surface of the water. Upon the approach of a submarine within a certain radius of it, the antenna attached to the buoy sends out wireless signals which are in turn picked up by receiving instruments installed in the air craft. The presence of a boat within this area is thus an-



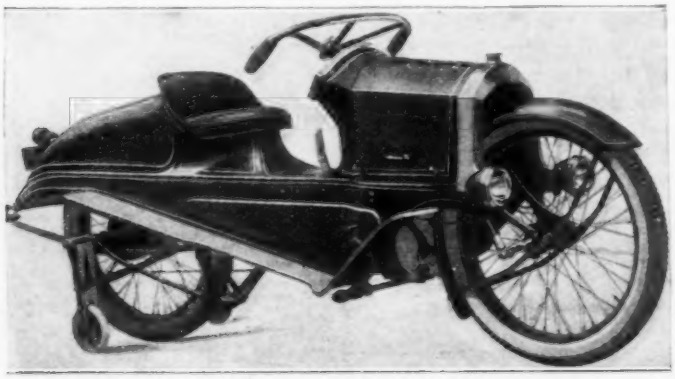
Showing the Submarine Detector in Use: When Thrown Overboard, as in the Background, It Floats on the Surface and Transmits Wireless Signals to the Airman if an Under-Sea Boat is Operating within a Prescribed Area

nounced. Its general position in relation to the buoy, as well as its movements, are indicated by the intensity of the signals. Assisted to this extent, the airman's search for the vessel is greatly simplified. After locating it, destruction can be carried out with aerial torpedoes or bombs that explode at predetermined depths.

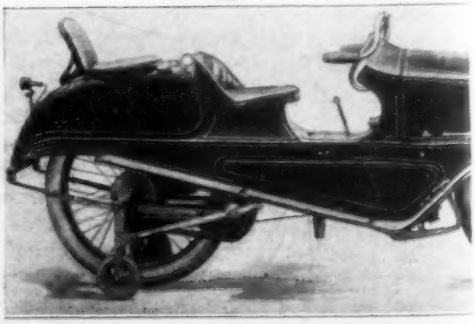
In scouting for submersibles, a number of the buoys would be carried. One would be dropped overboard as the flying boat passed out of range of a detector previously launched. In this way a large area would be patrolled. It would, of course, devolve upon speed boats to retrieve the buoys. Gratifying tests of the device have been made.

ODD TWO-WHEELED VEHICLE FOR CITY STREETS

There is a hybrid among the season's new vehicles. It is a cross between a motorcycle and an automobile, and in design closely follows the latter in some of its details. It is mounted on two wheels and at the back equipped with a pair of large casters that are adjustable and hold it erect when it is not in motion. A unit power plant with three-speed, selective gear transmission is employed. A radiator and hood, an instrument board, a racing-car seat, and running boards give the contrivance an attractive and automobilelike appearance. All parts are completely covered so that the driver is protected from grease and dirt. Fuel is carried in two concealed tanks on opposite sides of the rear wheel. The turtle back also hides a folding seat which, when raised, offers accommodation for a passenger. Pressed-steel construction gives the machine strength and lightness and indicates stability. Starting and stopping are accomplished without requiring the operator to place his feet on the ground.



Features of Both the Motorcycle and Automobile are Found in This New Two-Wheeled Machine



When Folded within the Turtle Back the Extra Seat is Completely Concealed from View

SHEEP-KILLING PARROTS ESCAPE INTO AMERICA

Not long ago no little consternation was created by the escape at San Francisco of two keas, or sheep-killing parrots, which were being shipped from Australia to the Smithsonian Institution, at Washington. The birds liberated themselves by splintering the slats of their wooden crates with their powerful beaks. The federal authorities offered a reward of $100 for each bird taken dead or alive. This species of parrot has made itself an enemy of man in both Australia and New Zealand by slaying sheep for the sake of eating parts of the flesh, of which it is very fond, and there bounties are paid for killing the birds.

VOLCANO A MONSTROUS STEAM BOILER

LIGHTS DISTANT CITIES AND DRIVES THEIR TROLLEY CARS

THE MOST REMARKABLE POWER PLANT IN THE WORLD

By LEWIS R. FREEMAN

Special War Correspondent for Popular Mechanics Magazine

Glaciers and Volcanoes Produce Same Power

IT was while going over one of the great munition plants near the west coast of Italy early in the war that the manager called my attention to the fact that the machinery of the three newest units was entirely electrically driven.

"The power for each of the three units has a different origin," he said, "and here, for the first time in history, you may see working, almost side by side, machines driven by electricity generated from a steam plant, by electricity generated from water power, and by electricity generated from the heat of the earth. It is the latter which runs the newest unit, and the supply of it, though it comes from a source a hundred miles away, is capable of being increased to such an extent that we contemplate drawing on it for any extensions we may be called upon to make to our plant in the future. It is a strange contrast, is it not, the latent power of Alpine snows sending a current to run the plant on our right, and the latent power of some sputtering hot springs sending a current to run the one on our left?"

Tapped Earth's Stores of Solar Heat

This was the first occasion on which I heard of a practical system for the generation of power from the heat of the earth, though I seemed to recall an article or interview, published some years previously, in which a distinguished American engineer had suggested that the inexhaustible heat reservoirs of the earth might be tapped by driving a bore the size of a wagon wheel through—or at least a great distance into—the outer crust. The plan was no more than a dream, and nothing, so far as I ever heard, has come of it. But some Italian engineers, with the direct practicality and common sense, of which the world is now having so remarkable an example in the war organization of their country, instead of wasting their time in boring into the solar heat, simply sought out a place where the solar heat had bored its way out to them—nothing more or less than just such a mineral hot-springs area as one encounters in so many parts of Europe, America, and other parts of the world. Here they carried out a series of exhaustive experiments in harnessing the steam which had been blowing to waste for so many centuries, and the same rare talent of inventiveness which enabled one Italian to solve the forerunning problems in long-distance transmission, and another to send the first wireless messages, again achieved ultimate and complete success. Some time before the outbreak of the war the principles of the exploitation had been worked out, so that when once Italy had thrown her weight into the great struggle and an unprecedented demand for power for munition manufacture arose, all that remained to do was to apply those principles; to do commercially what had been proved feasible by experiment.

World Event Unknown outside Volterra

One transmission line is much like another, and, in this instance, there was nothing to differentiate the tower-to-tower-swung cables of aluminum that led off from the steel and concrete power house by the glacier-fed torrent in the Alps from those which went off in the opposite direction from another—probably very similar—power house standing in the steam of the hot springs of Volterra. Much as I should have liked to follow the latter line to the miracle which has been wrought at the other end of it, I could not spare the time from an already scheduled visit to the Alpine front to make the journey to the remote, and by no means readily accessible, mountain region to which it led. In the months that followed I met no one at the front, or in any other part of Italy, who knew anything about the hot-springs electrical plant, and many there were who even ridiculed the practicability of the thing, saying that I must have misunderstood the description of the works, and that no such epoch-making discovery could have been made without its being noised to the ends of the world. But it was only another instance of an event of world-wide importance being obscured, or eclipsed, by the battle cloud of Armageddon. A few weeks ago—again on my way to the Italian front—I was stopping over in Florence, which chances to lie on the opposite side of a mountain range and something like 150 miles distant from the munition works which I had visited the previous year. From the terrace of the village of Fiesole, where I was staying, we were watching the evening searchlight drill above the valley of the Arno, when my host happened to remark that the power behind the questing beams might very well come from the new installation among the geysers of Volterra, as a transmission line had recently been completed connecting it with Florence. Beyond this, he knew nothing of what work had been done, or how it had been done, but as the fact that power was being distributed to the east as well as to the west indicated an extension of the scheme, I decided that no better use could be made of the two days that still remained to me before leaving for the front than by putting them in visiting the installation which had for so long been the object of my interest.

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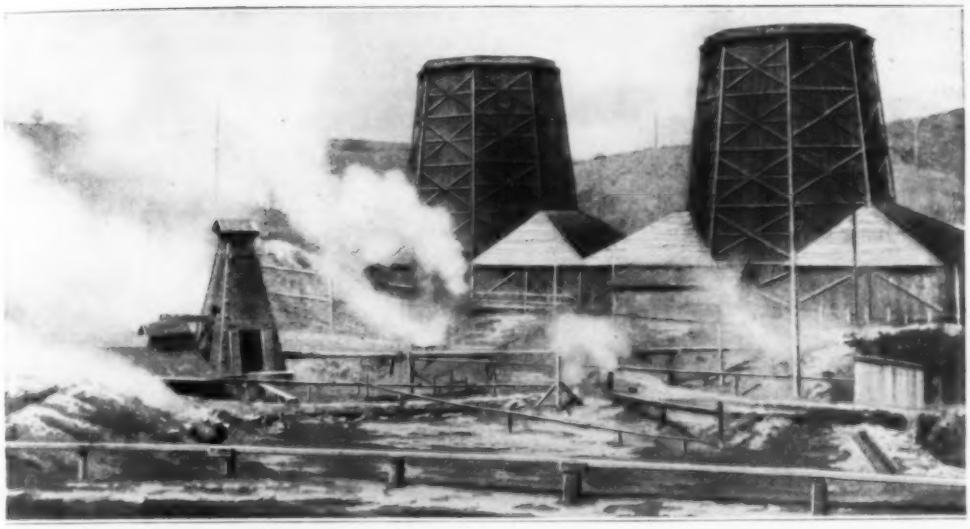
VOLTERRA is one of the finest and most perfectly preserved of the old Roman mountain towns, and, as a consequence of the power development at the hot springs in the near-by suburb of Larderello, there is perhaps no other place in the world where the ultramodern can be seen thrown into such striking contrast against the background of the truly ancient. The nearest thing to it which occurs to me offhand, is the hydroelectric plant near Damascus, situated at the foot of a waterfall fed from a spring said to have leapt forth from the mountainside at a stamp of the foot of the patriarch Abraham.

To the leeward of the "soffioni" (the Italian name for the hot steam jets of the Volterra region) the wind-blown fumes of sulphureted hydrogen recall that same odor-of-ancient-egg welcome extended to the visitor by the Norris geyser basin of the Yellowstone, the mud-volcano plain of the Colorado delta, and the great geyser area of Maoriland. It is only when the weird region comes into view that one envisages a scene which, with many details about it to suggest other places he has seen, still presents an ensemble that must be quite unique for the simple reason that there is nothing else in existence like it. The soffioni of this central Italian infernal region run more to steam and less to jets of solid water than do the similar eruptions of the Yellowstone, northern California, and New Zealand. The effect, however, is not unlike that of the upper geyser basin of the Yellowstone on a crisp fall day when the active geysers are resting and the cold air is condensing in thick white clouds the steam from the countless pools of boiling-hot water. The later volcanic formation of the Volterra area is doubtless responsible for the fact that the steam—where no attempt has been made to confine it by artificial means—tends to rise, in wavy tufts and plumes of cotton wool, from sinuous cracks, where that of the Yellowstone—as in most other hot-springs areas—spouts out through separate vents.

It is in the development, however—the things man has done—that the principal differentiation occurs. In the first place, the power house itself—though, as I had surmised, differing in no important essential, inside or out, from the box-shaped steel-and-concrete structures that one expects a modern power house to be in any part of the world—loomed up as a strange, almost a jarring, feature in a landscape where one had been accustomed to look for nothing more businesslike than tourist hotels and bathing establishments. The squat wooden derricks and the miles of large pipe running along the top of the ground suggested an oil field so strongly that the eye almost unconsciously sought for storage tanks or reservoirs; but I had already learned enough of the way in which the "harnessing" was being done to know that the derricks were employed in connection with drilling holes for steam vents, and that the pipes were for carrying the steam itself. Flat-topped, tapering octagonal structures, dotted plentifully about the exploited portion of the area, were unlike anything I had ever seen before, and it was in these, as I learned afterward, that were carried on the distinctive processes of converting the raw and mineral-charged steam into a medium which could in turn be utilized in the generation of electrical energy.

The manager received us kindly, and although certain of the processes are still being perfected, seemed quite willing to show and explain to us all there was to be seen. It is from what I saw and heard on this brief visit, and from the summary of a technical report by the distinguished Professor Luigi, D. Sc., consulting engineer of the company, that the following description is written. Professor Luigi himself, to whom, I am told, the principal credit for the solving of the intricate technical problems connected with the scheme belongs, I missed—by only a few hours—meeting in Florence.

The existence of the hot springs near Volterra is repeatedly mentioned in various Roman records, and there are indications pointing to the fact that in



In the Queer, Tapering, Flat-Topped, Octagonal Buildings at the Hot Springs, the Mineral-Charged Steam Superheats Generated Steam That Drives the Turbines

very ancient times an oracle was "operated" there, the future being read by the sibyl in the trance following her apparent strangulation in a jet of hot steam. The later Romans founded a spa at the place, though it does not appear that the waters are possessed of any notable curative properties. The Florentines came there to collect the incrustations of boric acid deposited by the evaporating waters, but it was not until something like a hundred years ago that a process was worked out by a French engineer for extracting that increasingly valuable product in commercial quantities. That process, strangely—in that it made the heat of the steam itself do the work—was the forerunner of the present system by which that same steam is turned into electrical energy.

The concession for exploiting this soffioni area has been held for a number of years in the distinguished Ginori-Conti family, and the present prince of that name has been for some time the president of the "Societa Boracifera di Larderello," which has been engaged in the production of borax and boracic acid. Improved processes of extraction had made this in itself a very lucrative industry, but up to about 1903 no use was made of the heat of the steam itself save in evaporating the borax-impregnated water and in warming the houses of the workmen in the little village of Larderello. In that year Prince Ginori-Conti began a series of experiments which have culminated in the present 15,000-hp. electrical plant and the first practical solution of the problem of utilizing the heat of the earth.

The first experiment consisted in applying as strong a jet of the steam as was available to a rotary motor, but with only sufficient success to encourage the continuance of the investigation. The next contrivance—a jet of steam applied to a small reciprocating engine connected to a dynamo—proved that the principle was correct, and ultimately enough power was generated in this manner to light a part of the works. Two facts had by now been demonstrated: first, that steam much hotter and under much greater pressure than that escaping from the fissures in the earth must be made available, and, second, that this steam itself was far too heavily impregnated with minerals to make its direct use in boilers or turbines practicable for steady operation. As there was no use to bother about the latter problem until the matter of the proper steam supply was settled, it

was this question to which the first attention was directed. Luckily, an entirely satisfactory method of effecting this end was hit upon at the outset.

The source—the reservoir, so to speak—of the steam was under an impervious stratum of hard rock from 300 to 500 feet beneath the surface, and the plan decided upon was to drive large bores down to this level and conduct the steam to the surface in iron pipes. The scheme worked admirably. The holes varied in size from 12 to 20 inches in diameter and, with the force of the steam concentrated where before it had been diffused in open fissures, a pressure of two, three, and even as high as five, atmospheres was obtained. The temperature of the steam issuing from these bores varied from 150° to 190° C., or from 50 to 90 per cent hotter than the usual boiling point of water, 212° F. The question was now whether or not this entirely satisfactory heat and pressure could be expected to be maintained, and to this end experiments extending over several years were conducted. At the end of this time it was apparent that none of these bores was likely to show any diminution in capacity provided no new holes were put down within 50 feet of them. With a continuous and practically unlimited supply of steam definitely assured, the next thing to do was to find a practical system of converting the latent energy of that steam into some form in which it would be commercially useful.

One more attempt was made, in 1906, to utilize the steam direct. An ordinary steam engine of about 40 hp. was used for this purpose, but while the thing worked admirably so far as the mechanical power of the steam was concerned, the boracic salts, sulphuric acid, and the sulphureted-hydrogen gas carried by the steam, set up a corrosive action which was fatal to the iron parts of the engine. After an exhaustive series of experiments, this difficulty was finally overcome by—to use Professor Luigi's words—"applying the superheated steam, not directly to the engine, but to a boiler; that is, by applying it instead of fuel to an ordinary multitubular boiler, in which steam was produced at a pressure of two atmospheres, then passed through a superheater, and afterward used for driving a 300-hp. steam turbine, directly connected with a triphase electric generator." The latter provided enough power for lighting the works and the villages around Larderello. It had been in operation successfully for several months when Italy entered the war, and it was the tremendous increase in the price of coal and oil—neither of which that country produces in more than negligible quantities—which gave impetus to the project of increasing the installation to a size sufficient to allow the production of power for transmission to Leghorn, Pisa, Florence, and other not far-distant industrial centers. Perhaps the most astonishing fact in connection with what followed is that, although the system was hardly out of its experimental stage, an installation capable of generating 15,000 hp. of electrical energy was designed, completed, and put into operation at less cost, and in less time, than a similar installation run by water power could have been built. For the sake of accuracy, I shall follow closely Professor Luigi's technical description of this epoch-making plant.

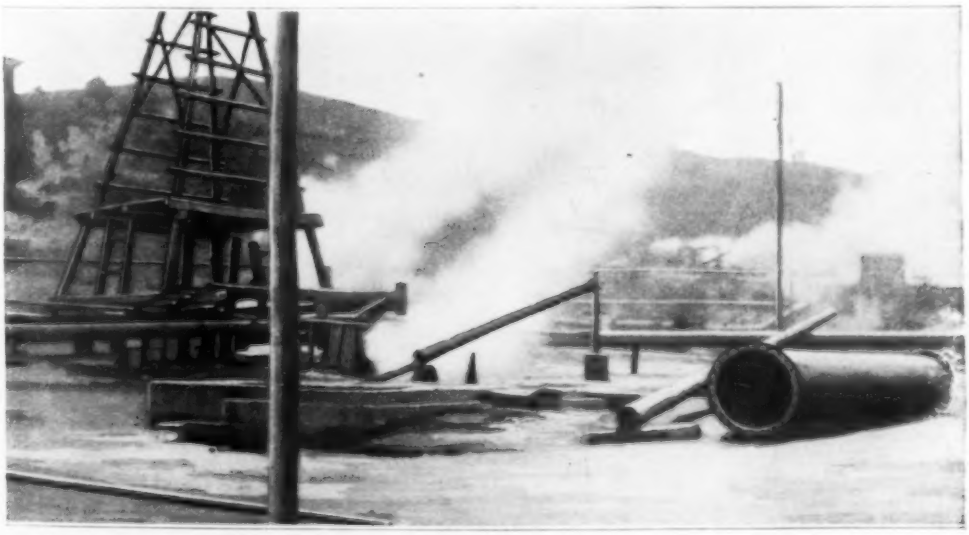
Acting on the advice of a Legano firm which had long specialized in steam turbines and alternating electrical generators, Prince Ginori-Conti ordered three groups of condensing turboelectric engines, each of 3,000 kw., working with superheated steam at one and one-half atmospheres, generated in specially constructed multitubular boilers, the latter arranged vertically and with aluminum tubes, both for better utilization of the heat and better resistance to the corrosive action of the steam from the soffioni. This steam, it is worth while to repeat, is used instead of combustible. It loses part of its heat in the boiler, reducing its temperature from 356° F. to about 248° F., and is then utilized for the borax industries.

The steam thus generated in the boilers is ordinary water steam, which

In the Background, Partly Clouded, Is One of the Squat Derricks, and in the Foreground a Pipe Line That Carries Subterranean Steam to the Power Plant

on its way to the turbine passes along aluminum pipes heated outside by a current of superheated natural steam, at 356° F., and thus gets in turn superheated to about 302°. After passing through the turbine this steam is discharged into a surface condenser, the circulating water of which is in its turn cooled in an ordinary cooling tower. The condensed steam of the turbines is, of course, pumped back into the boilers, and thus no natural steam ever comes in contact with the turbine. By this arrangement corrosion was completely avoided. This was the real difficulty to be overcome.

The 4,500-volt triphase electric current is stepped up through an oil transformer to 36,000 volts, and transmitted to Florence, Leghorn, Volterra, Grosseto, Cecina, and a number of the smaller towns of Tuscany. The long-



Close View of a Derrick That is Drilling through an Impervious Rock Stratum to the "Reservoir" of Natural Steam Some 500 Feet beneath the Surface of the Ground

est distance to which it is transmitted at the present time is something less than a hundred miles, and it is probable that a market for all power likely to be developed in the near future will be readily found within that radius. The principal uses of the power at present are in munition making, running tram lines, and lighting.

Careful experiments have shown that each of the bores put down in this region can be depended upon to produce steam of a temperature of from 312° to 392° F. At the average rate of 33,000 to 55,000 lb. per hour, this gives a theoretical horsepower of from 1,000 to 2,000 for the same period. On the basis of these figures, Professor Luigi estimates that hundreds of thousands of horsepower can be produced in the Larderello region, as the soffioni area covers many square miles. He also believes that in the "Campi Flegrei" region, near Naples, where the ground, at even so slight a depth as 100 ft., has been found red-hot, a similar utilization of volcanic heat can be made.

As neither of these regions is of anything approaching the extent of the geyser countries of the Yellowstone Park or of New Zealand, or, indeed, many other hot-springs areas which are known to exist in both of the Americas as well as in Asia and Africa, the vista of possibilities opened up by this latest of the great scientific problems Italians have solved for the benefit of the world, fairly staggers the imagination. It must certainly be numbered among the greatest, if it is not actually the greatest, of the gifts to humanity that have been brought about by, or at least greatly accelerated through, the war.

EXPUNGING TEXTBOOKS A BIG TASK

In these days textbooks, as well as press dispatches, are being censored and in some of the large cities the task of altering the former, to comply with new or more accurate conceptions of truth, has been a big one because of the large number of books to be handled. In Cincinnati a special board of censors barred seven German texts formerly used in the high school, and ordered that passages in four others be eliminated. To carry out this ruling six women were employed to go through all the partly objectionable books and make them suitable for use. In some cases they tore out whole pages and in others the obnoxious passages were covered with thick white paper.

Women Engaged in Eliminating Objectionable Passages from German Textbooks Used in the Cincinnati Public Schools

ALASKAN CITIES DAMAGED BY UNEXPECTED FLOOD

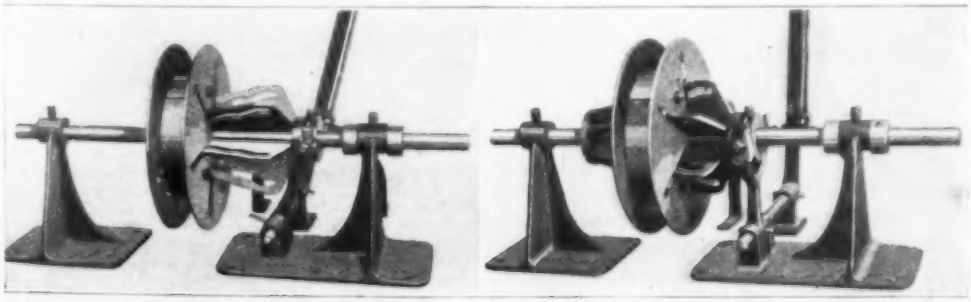
Considerable damage was done to the new government railway and other public and private property early last fall when a serious flood swept Seward, Valdez, and intermediate Alaskan points contiguous to Prince William Sound. The deluge was the result of a heavy unseasonable rain that lasted three days and ended with a cloudburst. In the vicinity of Seward much of the railroad was inundated and sections of it were washed away. Residences and buildings in the two cities met with similar fate, several of them being completely demolished. The lighting plant at Seward was flooded and the city left in darkness, while, to make matters worse, the pipe line that supplies the community with water

One of the Points at Seward, Alaska, Where the Government's New Railway Line was Washed Out by the Raging Torrents That Swept through the City

was washed out at several points. It was only by heroic work on the part of all the inhabitants that the business section was saved. Men worked day and night constructing wing dams and dynamiting log jams. Every available motor car and horse was commandeered for the work.

ALL GEARS ARE ELIMINATED IN VARIABLE-SPEED PULLEY

One of the outstanding advantages of a variable-speed pulley of distinctive pattern lately developed is that it enables an operator to make minute variations in the speed ratios of the driving and driven shafts without any interruption of power transmission. Another striking point is that all gearing has been eliminated. Only a few parts are employed. The pulley is adapted to a wide range of uses and is said to be capable of governing the speed of a delicate mechanism as perfectly as that of a powerful stamping press. Essentially the member consists of a pair of flanges, a set of steel segments that forms the face of the pulley, and six slotted and notched vanes. The latter are mounted on the shaft and arranged to work in and out of the flanges and effect the expansion and contraction of the spring segments, thereby changing the diameter of the pulley.



The Circumference of the Pulley is Changed by Moving the Vanes In or Out: This may be Understood by Comparing the Picture at the Left with That at the Right

FORCIBLE-FEEDING DEVICE TO MAKE POULTRY FAT

Forcible feeding, besides being resorted to as a means of counteracting

Forcibly Feeding a Fowl with a Machine Recently Invented in Europe: By Filling Its Crop Once Daily with the Proper Food a Chicken Fattens Rapidly

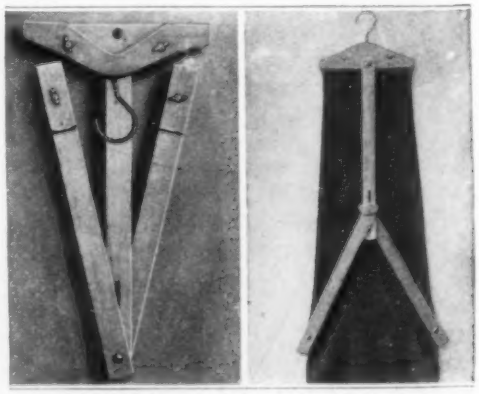
the effects of "hunger strikes," is also employed to make chickens fat. Recently a machine for this purpose, similar to one lately devised in Europe, has been employed with success in this country. It consists essentially of a cylinder placed horizontally on a tripod and having a plunger that is operated by a foot lever. The cylinder is filled from a pail mounted just above it. After inserting a discharge pipe in the mouth of the fowl to be treated, the lever is pressed down slowly, filling the crop with the fattening material. One such feeding daily will cause a confined fowl to put on weight rapidly.

SULPHITE LYE EXPLOITED BY SWEDISH INDUSTRIES

Considerable importance is attached to the discovery in Sweden of a practicable means of removing the water from residual lye obtained in sulphite manufacture. Since the beginning of the war there has been demand for the substance as a coal-tar substitute. It also takes the place of resin and glue for cementing purposes, is valuable as raw material in the production of dyestuffs, and is useful in the manufacture of alcohol. It contains about 90 per cent water, and the difficulty of concentrating it has heretofore interfered with its use. By the new method, the water is frozen and in that way removed. The organic substances are to be separated so that they can be used in a number of different industries. It is estimated that 800,000 tons of valuable matter has been wasted annually in Sweden alone and that the new scheme of separation will convert loss into profit.

TICKET-VENDING SEMAPHORE FOR WAY STATIONS

At Kansas City an electric interurban railway has tried out, with gratifying results, a coin-operated semaphore intended for way stations where cars do not stop unless signaled. To operate the signal, one places a nickel in the slot and presses a lever. This actuates the semaphore arm, ignites a red lamp, and issues a five-cent ticket to the prospective passenger. The device eliminates the necessity of patrons striking matches and lighting newspapers when trying to flag a car at night.



FOLDING TROUSERS STRETCHER

By means of clamps at the extremities of this folding wooden frame a pair of trousers can be stretched as shown and, after a few hours, will be entirely free of wrinkles. After fastening the clamps in place the frame is extended as much as desired and then locked by means of a nut and bolt at the center of the stretcher. Folded, the device occupies little space in a suitcase.

WALKS ON HANDS TO SUMMIT OF WHITE-CLAD PEAK

The Legless Newsboy and His Wife Resting for a Moment on Their Way to the Summit of Mount Hood: At the Right They are Shown Again with Other Members of the Party at the Forest-Service Lookout Station

On His Way to Establish a World's Record in Mountain Climbing, Joe Harty, His Companions, and the Pack Train: The Arrow Indicates the Newsboy

Snow-capped Mount Hood, a difficult, exhausting climb for the seasoned sportsman, has been scaled by a legless newsboy. The story of the young fellow's accomplishment offers a wealth of material for the moralist, for from beginning to end it is a lesson in ambition and perseverance. His name is Joe Harty and he sells papers in Portland, Ore., where the white slopes of the distant peak offer an inspiring picture on clear days. For years the desire to climb the mountain obsessed his mind. A few weeks ago, accompanied by two guides, a forest ranger, and his wife, the newsy's determination won out. He did what hundreds of strong, normally constituted men have failed in their attempts to do: he reached the uppermost pinnacle of Mount Hood. Part of the trip was made on horseback, but when the steep grades were encountered it was every man for himself. The newsboy was equipped with an improvised sled and blocks studded with heavy spikes. These implements, however, proved more of a hindrance than help and were discarded. Raising himself on his abnormally strong arms, he flung his body up the inclines several feet at a time and often made better progress than others of the party. When ropes were used, Harty was in his element, for his strength enabled him to clamber along with remarkable ease and swiftness. The descent of the snow-packed slopes was a hilarious experience. A guide would precede him a hundred feet or more and catch him as he slid down at a fast clip. He afterward said, "I tell you, that part was fun!" As might be expected, the climb has made Harty and his news stand famous.

PNEUMATIC VALVE GRINDER OF ALUMINUM AND STEEL

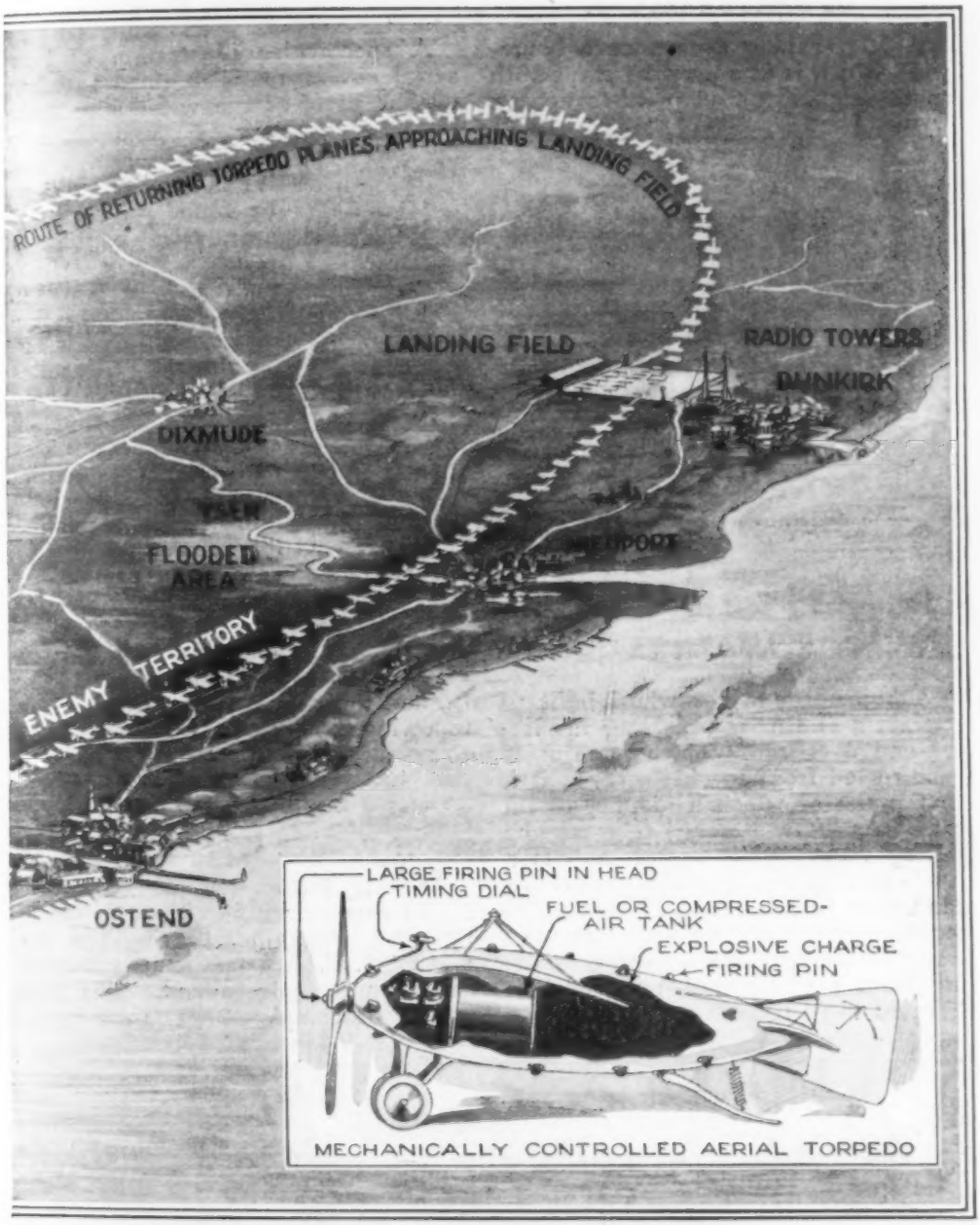
A labor-saving device which has recently come into commercial use is a pneumatic valve grinder made of die-cast aluminum and hardened steel, the latter being used for the working parts. It is so designed that it operates with an oscillating motion. The grinder is easy to handle because it weighs only 2¼ lb. An air pressure of 10 lb. is sufficient for ordinary operation, but by increasing it, ¼ hp. can be developed.

WINGED VICTORY IS HOVERING

TO combine the submarine's torpedo, the aeroplane, and the wireless telegraph into one irresistible engine of annihilation has for months been the dream of a group of inventors, among whom are a few men in the forerank of science. Our "liberty motor" was built "overnight" behind bolted doors in a Washington hotel! Will the radio bombing plane and the flying torpedo be similarly evolved in time to crumble the fortresses of autocracy along the Rhine?

Presented above is a graphic illustration of how pilotless air craft directed from Dunkirk might bomb Zeebrügge, Bruges, and Thourout without the loss of a single flier. It portrays aerial warfare with the human element eliminated. A number of these weird projectiles are launched from a station safely removed from the actual battle zone. Directed by wireless, they follow a given circuit, auto-

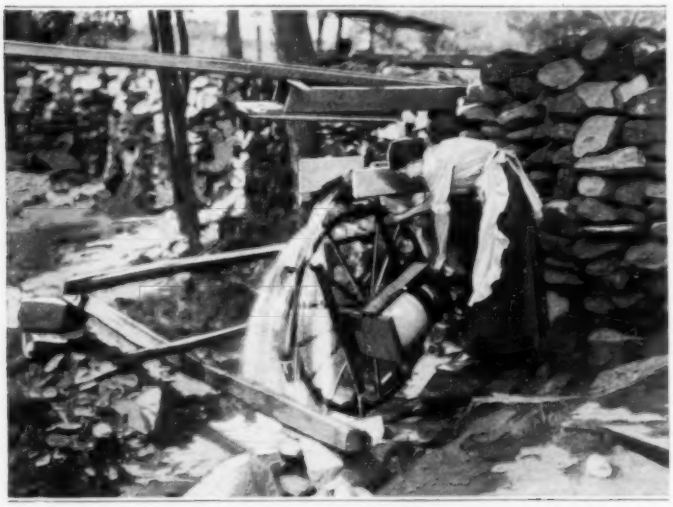
WITHIN THE GRASP OF SCIENCE



matically dropping powerful bombs on the enemy strongholds. Previously, machines of the same type have made photographic records of the enemy-controlled territory from which the points of attack have been determined and the timing mechanism for releasing the bombs set accordingly. General details of this type of machine are suggested in the upper left-hand insert. The insert on the right shows another idea for a winged torpedo, not radio-operated, but driven by compressed air, gasoline, or clockwork. It could not carry as much explosive as the first and its operating radius would be more limited, but for certain work it would be quite as effective. While to the conservative mind a multitude of difficulties forestall the realization of this scheme, it must be admitted that they are chiefly matters of adaptation rather than of principle.

PICTURESQUE WATER WHEEL OPERATES CHURN

A labor-saving device for a housewife, which is in a class by itself both as to originality and picturesqueness, is a homemade water wheel built to operate a churn by revolving the latter end over end. The apparatus is constructed from an old buggy wheel, to the rim of which a number of tin cans have been attached to catch the falling water, while at the hub is a crude wooden frame in which the churn can be securely fastened. The wheel is mounted just beneath a little stream of water that flows from a spout protruding from a stone wall, and revolves from 60 to 90 times a minute.



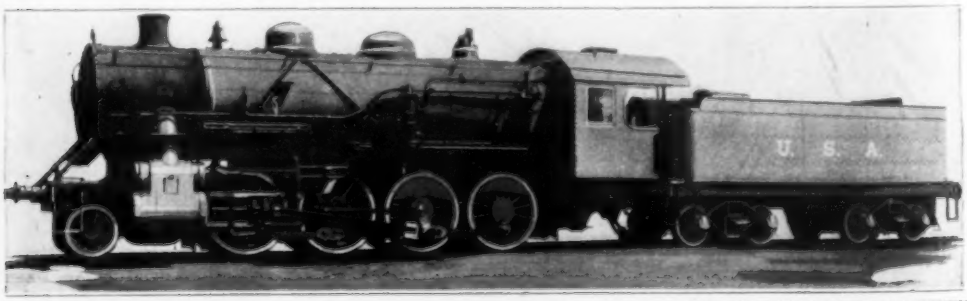
Water Wheel Made by a Farmer's Wife from a Few Articles Found Close at Hand: It Revolves the Churn 60 to 90 Times a Minute

AIRMEN FLY FROM ITALY TO ENGLAND

A spectacular illustration of how aerial navigation is destined to bring distant parts of the world into more direct communication than steamships and trains have done, is to be found in a recent aeroplane journey which two Italians made from Turin, Italy, to London. The distance covered is approximately 650 miles and the time consumed was 7 hr. 22 min. 30 sec., according to dispatches. The airman who drove the machine was the same skilled flier who not long ago flew from Turin to Naples and back, a distance of over 900 miles. The Alps were crossed at an altitude of 12,000 ft., and the course was determined by following the routes of certain railways to northern France.

BIG WAR LOCOMOTIVE BUILT IN THREE WEEKS' TIME

At one locomotive works where 25,000 men are employed, 30 big battleship-gray engines bearing the insigne "U. S. A." are being produced daily for the government. The first one to be completed was built in 20



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Only 20 Working Days were Spent in Building This, the First of the Government's New War Locomotives Destined for Use on Our Military Lines in France

working days. Six hundred and eighty of similar type and some 9,000 standard-gauge freight cars are under contract. Each of the locomotives, including its tender, weighs about 275,000 lb. and costs $43,000. The equipment is being constructed for use on the American military railways that are now being established by our engineers in France.

BACKLESS DRESS WAISTCOAT DESIGNED FOR DANCING

Those who dance will readily appreciate the design of a dress waistcoat that has been introduced for men of discrimination in matters of apparel. The model is distinctive in that it has no back and therefore affords comfort and perfect freedom of movement. Relaxation is requisite for graceful dancing, but difficult of attainment when one is bound in a tight-fitting garment. The new waistcoat is without armholes and cannot bind the shoulders. It is held in position by a band of medium width that crosses the small of the back. The garment fits snugly and is supposed not to have a tendency to ride the collar. Obviously there is no material that can bunch and destroy the hang of a coat.

URGENT APPEAL POSTED ON FREIGHT CARS

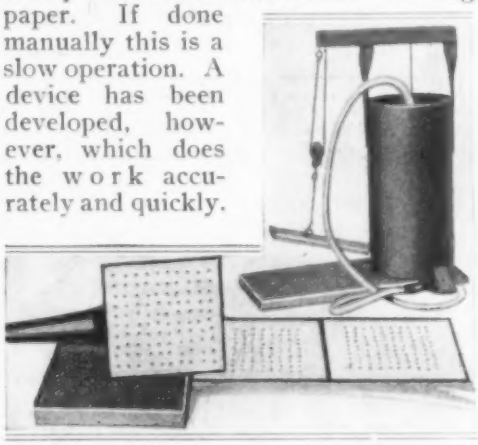
In such a routine matter as loading and unloading freight cars the progress of the war can be furthered or hindered by the speed of the workmen, because nowadays there is need for every car, every hour of the day, and at best, there are scarcely enough cars to go around. This fact has been well emphasized in a poster that the Santa Fe Railroad is tacking to the doors of its freight cars, the wording of which

A Patriotic Appeal, Decorated with Red, White, and Blue Stripes, Which is being Posted on Freight Cars Belonging to the Santa Fe System

is shown in the accompanying illustration. Red, white, and blue stripes adorn the top of the notice.

SEED COUNTER SERVICEABLE IN GERMINATION TESTS

When testing seeds, it is necessary to count them and then space them evenly on moist sheets of blotting paper. If done manually this is a slow operation. A device has been developed, however, which does the work accurately and quickly.



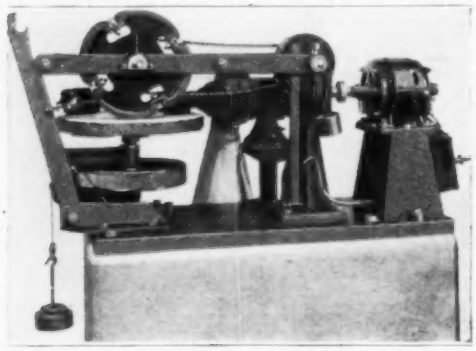
Counting and Spacing of Seeds, When Making Germination Tests, Is Unnecessary if the Suction Instrument is Employed

It is used in conjunction with a vacuum pump operated by exerting pressure on a foot pedal, and consists of a metal contrivance having a square, flat surface with 100 small perforations. When this is brought in contact with a quantity of grain and a partial vacuum

created, the suction draws a kernel over each of the orifices. By then placing the instrument on a blotter and releasing the pressure, the seeds are deposited in regular order on the sheet. Any error is readily apparent and can be immediately corrected.

SOLE LEATHER IS TESTED BY NEW APPARATUS

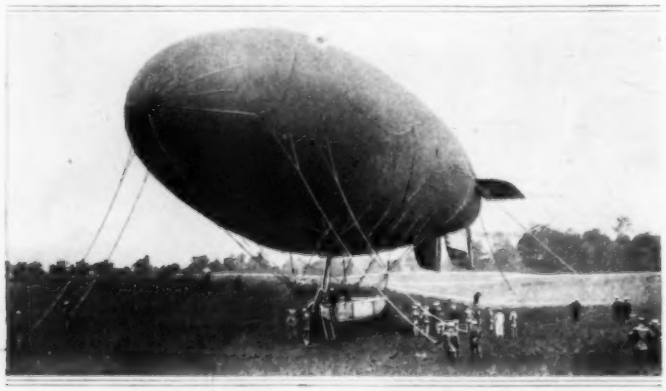
For determining the wearing quality of sole leather, a machine that subjects samples to conditions approximating those encountered by boots and shoes in actual use has been developed by the Bureau of Standards. One of the essential parts of the apparatus consists of a clover-leaf cam, about 11 in. in diameter, to the face of which four test pieces may be applied. It is mounted vertically between parallel bars pivoted at one end, and rests on a 15-in. horizontal disk which has a cement-mortar surface. The point of contact is 5½ in. from the center of the latter member. The cam revolves at a speed of about 30 revolutions a minute and while doing so drives the abrasive disk, the axle of which is equipped with a brake wheel that provides, through application of weights, any desired resistance to rotation. The cam, in bringing the leather samples in contact with the rough surface, subjects the material to a moderate impact, a shearing action under pressure, and an abrasive action. Forty thousand revolutions produce about the same wearing effect as a 20-mile walk. The samples are weighed before and after the test. The loss in weight indicates the amount of wear, and that in turn gives an index to the quality of the leather.



Bureau of Standards' Leather Tester: Four Samples are Applied to the Face of the Cam, Which by Contact Drives the Abrasive Horizontal Disk

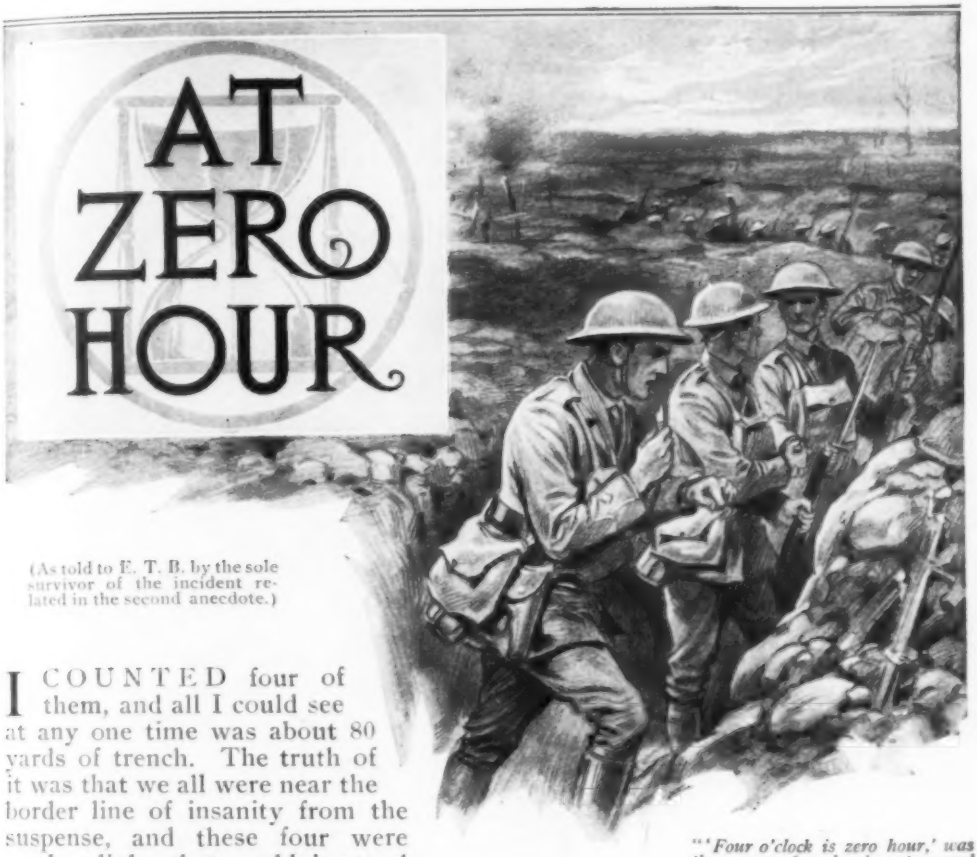
NAVY'S NEW "BLIMPS" MAKE GOOD SHOWING IN TRIALS

In official tests of the first of a group of flexible dirigibles under construction for the Navy Department, government requirements were exceeded by a comfortable margin some weeks ago. Prolonged flights covering speed, altitude, endurance, quick ascent and descent were made with completely satisfactory performances. The craft are of a type that in Great Britain and France has been used almost exclusively and are popularly known in the former country as "blimps." Our navy will use them for coast and harbor-patrol duty, for which they are better suited in many respects than planes. Pontoons are mounted beneath the nacelle so that descent can be made either on land or water.



One of the Navy's New "Blimps" Ready to Make an Ascent during the Official Trials Recently Conducted: The Dirigibles are to be Used for Coast and Harbor-Patrol Duty

AT ZERO HOUR



(As told to E. T. B. by the sole survivor of the incident related in the second anecdote.)

"'Four o'clock is zero hour,' was the message from headquarters, and all along the trench men clasped hands silently, or patted each other on the back."

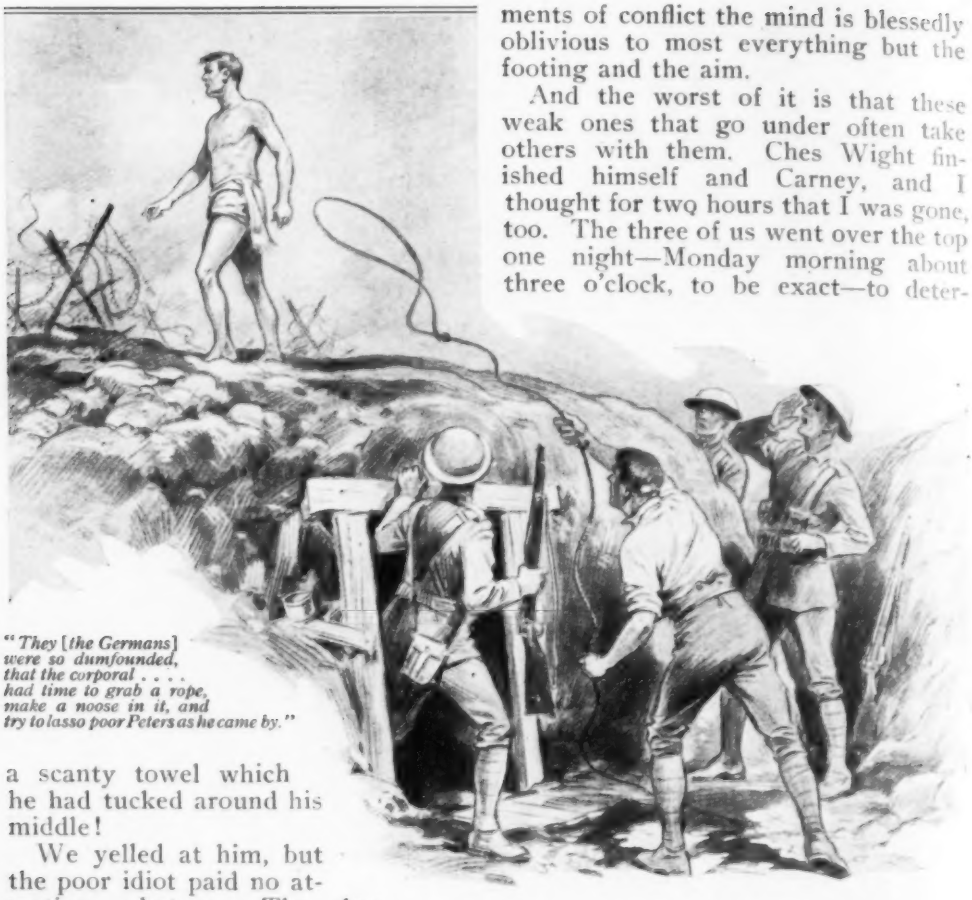
I COUNTED four of them, and all I could see at any one time was about 80 yards of trench. The truth of it was that we all were near the border line of insanity from the suspense, and these four were weaker links that couldn't stand the stress. All along the line it was just the same, for every man knew IT was coming, and yet did not know when. IT stood for "zero hour," the moment our big attack was to start.

First was a chap by the name of Peters from somewhere out in Ontario. He had been gassed at Massiges—took a good sniff of chlorine, not enough to kill him, you understand, but sufficient to put him back in the base hospital for two months.

At any rate, he wasn't up to par when he joined us at Rheims. He was a good-looking chap too, blond and broad-shouldered, though rather short; his face, when I saw him, was lined and rather set in expression. He looked rather as I imagine a man might look who has gone over Niagara Falls in a keg, but no one paid any particular attention, for among the number of us who had been punctured, shocked by the big shells, gassed, broiled by "flammenwerfer," blinded by tear bombs, and kept awake for long periods of time, there were many blank dominoes.

It was two o'clock on a Friday afternoon when Peters broke. The sun was beating down from a clear sky, and except for what we all knew was coming we were quite comfortable, though warm. Our artillery was making mincemeat of the German batteries, placing three shells to the Teutons' one. Everyone but the sentries was under cover, for our work would be heavy enough when it came.

Of a sudden a cry of surprise ran down the trench. A row of heads poked up, their owners gaping at the deadly ridge above, the border of No Man's Land. I stared too, for up there, striding along as unconcernedly as if it had been the corridor leading to his private bath, was Peters, clad only in



"They [the Germans] were so dumfounded, that the corporal . . . . had time to grab a rope, make a noose in it, and try to lasso poor Peters as he came by."

a scanty towel which he had tucked around his middle!

We yelled at him, but the poor idiot paid no attention whatever. The desultory rifle fire from the German trenches 70 yards away ceased abruptly, and I knew that they were staring also, unable to comprehend what this strange new maneuver might mean.

They were so dumfounded that a corporal in the company next beyond mine had time to grab a rope, make a noose in it, and try to lasso poor Peters as he came by. The rope fell short, however, and the next instant came "Br-r-r!" from a German machine gun, and Peters toppled over.

Somehow or other an incident like that brings home the hideous reality of war stronger to me than even the ear-breaking thunder of heavy shells, for it emphasizes the strain that we all are having to bear. One sees every detail, while in the more active moments of conflict the mind is blessedly oblivious to most everything but the footing and the aim.

And the worst of it is that these weak ones that go under often take others with them. Ches Wight finished himself and Carney, and I thought for two hours that I was gone, too. The three of us went over the top one night—Monday morning about three o'clock, to be exact—to determine whether or not the Germans had evacuated their first-line trench. We had reason to suspect that this was the case, for not even the Huns could mistake what was coming. Our batteries had concentrated their fire—a huge preponderance—for eight days already; we had rehearsed the whole program behind the lines twice, and were all set for the signal.

Wight, Carney, and I crept out. Heavy clouds covered the whole sky, not even letting the glimmer of a star through, so the time was ideal for reconnoitering. We had covered about 40 of the 70 yards, and were beginning to hear gutturals now and then, when suddenly I smelled garlic—not garlic cooking, but the stench that comes from the breath of a person who has been eating it.

I touched Carney on the leg and he signaled to Wight, who was just beyond. That same instant we saw him, a hulking shadow, creeping toward us and very near. The three of us put an end to his scouting duty quickly and without much noise. We just made sufficient, however, in choking him, to arouse the trench ahead of us. Stealthy sounds came up of many men scrambling to the edge.

We could have no further doubt that the trench still was occupied, so Carney and I started back without more ado. We could not see Wight, but thought, of course, that he was at the side of us. Just as we were 20 feet from home, however, we heard a bloodcurdling yell behind us. Outlined roughly against the lesser blackness of the sky came Wight, running and waving his arms.

A commotion arose in our trench. As Wight charged on, our sentries, evidently mistaking him for the van of a German surprise attack, opened fire and brought him down. Carney and I both lost our heads for a second and started up. That was enough for Carney. He went down with four Canadian bullets through him. One shot cut through the skin on my arm just above the elbow, and it brought back sense to me. I dropped flat.

For the next two hours I remained without moving, afraid to attempt to make the trench before the dawn guard was posted. I tried to call the attention of one of the earlier sentries, but to no avail. I knew that the barrels of 30 rifles and two machine guns were hanging over the edge, pointed in my general direction, waiting for more Germans.

With the first streaks of dawn I gathered all my courage and called my captain by name, and then each of the officers in turn. Then I crawled in, to be met by a very suspicious sentry, who had great difficulty in recognizing me.

Three days later I found out that Wight had apparently gone daft upon overcoming the German we met out on the waste. He had stopped to search the body, and then had donned the helmet of our adversary, and started a charge all by himself—and in the direction of our trenches.

The twist of psychology is hard to understand, perhaps, but it is common. Once in a big university football match I saw the captain lose his head in this manner, and forget which goal his own team was defending, but it always seems to border on the spooky to me.

Kegley's case was much on this order. He was a member of a "bombing party" from our trench. The squad of six set out much as had Wight, Carney, and myself. Their object was not secrecy, however, after they had covered half the distance to the German trench, for at this point they all let fly with their missiles. Their stint was to get rid of the eight grenades carried by each, and then to scurry back to our trench before the Germans could get them.

This program was carried out, except for Kegley. He apparently got badly mixed as to directions in the semidarkness, and when he ran for cover he ran directly toward the German trench! Three or four bayonets rose to meet him as he scrambled over the edge.

The saddest case of all these that we ascribed to the suspense of waiting for the "big push" was that of a young lieutenant whom I shall not name. He was a city lad who had obtained his commission the Lord only knows how. He was a nice enough boy, all right, but made of the material from which officers never should be chosen. He was slim, youthful, nervous, sensitive, and temperamental. I suspect that deep down in his heart he thought himself a coward. I know that he shrank from the roughness of the men, and kept himself well within his shell all of the time.

It was just the day before the long-awaited signal really did come when he went out. And I'll say for him that he did a good job of it. He was not content with shooting himself in the left hand, the stunt adopted by many of the German privates to escape serv-

ice, but shot himself through the heart, shortly after noon mess.

When, about six the next evening, our phone operator jumped to his feet and whispered the thrilling message, we rejoiced, and all the suspense was forgotten. Action was coming! "Four a. m. is zero hour!" said the message from headquarters, and all along the trench men clasped hands silently, or patted each other on the back. After two weeks of waiting there seems to be nothing in the world that seems so delightful as the prospect of real action.

You see, we all knew our parts as thoroughly as if the bit of entertainment we were to give the Germans consisted of a bit of movie slapstick, all timed to be photographed within the space of two reels. The program given to us had been simple, for we formed part of the first wave in the eight-wave attack. We knew that when zero hour should arrive, whistles would blow, and we would scramble out of our protecting trench and walk—not run—to the first-line German trench. As we emerged, our barrage fire would be bursting 50 yards ahead of us. It would lift 25 yards every 10 seconds. Our stint was to take full advantage of it without walking into it ourselves.

Close behind us would come the "trench cleaners" or "moppers-up" of our wave, and then closely behind, advancing at an absurdly moderate pace, the other seven waves.

In respect to this attack, I scarcely can describe it from its actual happening, for any one man's part in a push which extends over a front of 12 miles is ultramicroscopic. I did see a great deal of it as it was being rehearsed, however—they put us through it all twice, far back of the trenches—and I know that this was the method employed, for we gained every objective.

When the rehearsals took place, they were enacted on ground which was an exact replica of that which lay before us across the waste of No Man's Land. Every trench was there, every clump of bare poles—that once had been trees—was indicated, every house and barn was marked, and every German battery that our aeroplanes could chart was placed on our eight-mile-deep map. These were "dress rehearsals" in every sense of the word.

We were placed in formation exactly as we would be at zero hour; that is, every wave and every man in that wave had his position determined and his time schedule of advance.

One wave was almost exactly like another, so I shall describe the unit of which I was a member.

On the 12-mile front first came three continuous lines of grenadiers, spaced in skirmish formation, which means that each soldier was three yards from the next man to him. The men in these first three lines carried nothing but hand grenades.

Behind these came two lines, also as skirmishers, which were alternated in equipment. Taking a regiment as the unit, the first man on the left carried a machine gun. Then came three rifle grenadiers, another machine gun, three rifle grenadiers, and so on down the length of these two lines.

On the heels of these followed two lines of riflemen with fixed bayonets, whose duty it was to give the "rebel yell" and charge calculated to demoralize the enemy.

Immediately after these came an aggregation, two lines deep, that to me seems the most interesting of all in modern warfare. These were the "trench cleaners" or "moppers-up" that I mentioned previously. Imagine, if you can, a team of champion Rugby or American football players—a team of 8,000 such men, spread out in two lines over a 12-mile front—with every man a broad-shouldered husky capable of handling a small piano single-handed, and you have a flash of the appearance of the trench cleaners. This formidable assemblage was armed with weapons that remind one strongly of the police exhibits at yeggman trials—sticks, cudgels, shillalahs, blackjacks, poniards, sandbags, two-handed swords, battle-axes, tomahawks, brass knuckles—anything and everything

that the lower strata of civilization has found useful in personal combat since the days of the first Ptolemy and Lief the Lucky. One thing only seemed lacking: the trench cleaners carried no firearms of any kind.

This assemblage of "knock-down-drag-outers" follows upon the heels of the bayonet charge, and has for its duty the extermination of all pig-headed Teutons who cannot escape and will not surrender. There really are many such

"As Wight charged on, our sentries, evidently mistaking him for the van of a German surprise attack, opened fire and brought him down."

men who become fired with the flame of battle until they lose all reason and sense of proportion. Because it is highly dangerous to an advancing army to have small detachments of the enemy creating a disturbance when the van has passed on, the trench cleaners are carried to do literally what their name suggests.

And this constitutes one of the eight waves of a normal infantry attack nowadays. It has a definite objective which it must not miss and cannot exceed. For instance, as was the case with us, the time card may say succinctly, "Zero hour, advance rapid walk. Barrage twenty-five in ten seconds. Take first trench 0:20." Or, in the case of the second wave, the card may read exactly the same up to the last sentence. From this point it goes, "Pass first trench 0:23. Take second trench 0:35." The third wave is instructed to take the third trench, and so on, for as many lines as the enemy possesses. The fifth, sixth, and seventh waves will have instructions similar to this, "Occupy Hill 137, 12:45," or "Dig in behind clump of trees, 15:08." In each of these, zero hour is understood, the first numbers standing for minutes and the second for the seconds. The whole affair may take two or three hours to be completed, but the units proceed to their specific assignments strictly according to the prepared schedule.

On the morning which I have described, the period of our nervous tension was over sharp at four a. m. Whistles shrilled along the whole front, and we proceeded to attack behind our barrage just as I have described. From that point until nearly a half hour later, I saw only that part of the fight which was within 30 yards of myself. I was one of the machine gunners, and though we managed to take the trench assigned to us, we en-

countered stiffer opposition than we had anticipated.

At seven o'clock all was over, however, and the Germans had dug in again in positions eight miles back of their previous front lines.

Dispatches stated it all very prosaically, "This morning the Canadian and British troops succeeded in penetrating the German lines to a distance of eight miles along a 12-mile front east of Rheims."

TEN-FOOT PHOTOGRAPH MADE BY INGENIOUS PATCHWORK

Quite an interesting piece of photographic handiwork has been fabricated by a photographer who is as clever

At Work on the Big Panorama, Which Since Completion has Often Passed as a Legitimate Photograph

with scissors and paste as he is with the camera. He has made a 10-ft. panoramic view that shows a tremendous crowd blocking the streets in the vicinity of an eastern newspaper office while watching a baseball score board. The work was produced by taking 24 separate panoramas, enlarging them, and then, by ingenious cutting and fitting, grouping them into a composite picture. Except when closely scrutinized, the finished panorama has the appearance of being an enormous enlargement, rather than well-executed patchwork.

LATE GERMAN INDUSTRIAL DISCOVERIES REPORTED

According to commercial reports that have reached this country, a number of very interesting industrial discoveries have lately been made by the Germans. Viscous, golden-yellow mineral oils have been obtained by treating coal with liquid sulphurous acid. By heating naphthalene under pressure and in the presence of aluminum chloride, an illuminating oil has been produced as a kerosene substitute. Insoluble carbon compounds in coal have been converted into soluble ones by an ozone treatment, the chemical value of which is not as yet known. A new process for extracting nitrates from the atmosphere has increased efficiency of about 80 per cent. Strides have been made in producing substitutes for copper, brass, and bronze. In this connection special mention is made of zinc and lead alloys. In smelting copper schists it has been found possible to reduce the workable limit from 2.5 to about 0.7 per cent. A scheme of removing aluminum from clay has proved so successful that it is stated Germany will hereafter be independent of foreign bauxite. The rubber situation has been improved by the development of a method of regenerating old material.

¶A recent dispatch announces the completion, in connection with the Cape-to-Cairo Railway, of the railroad to Bukama, on the navigable Congo. Thus another important step has been taken in providing "the dark continent" with modern transportation.

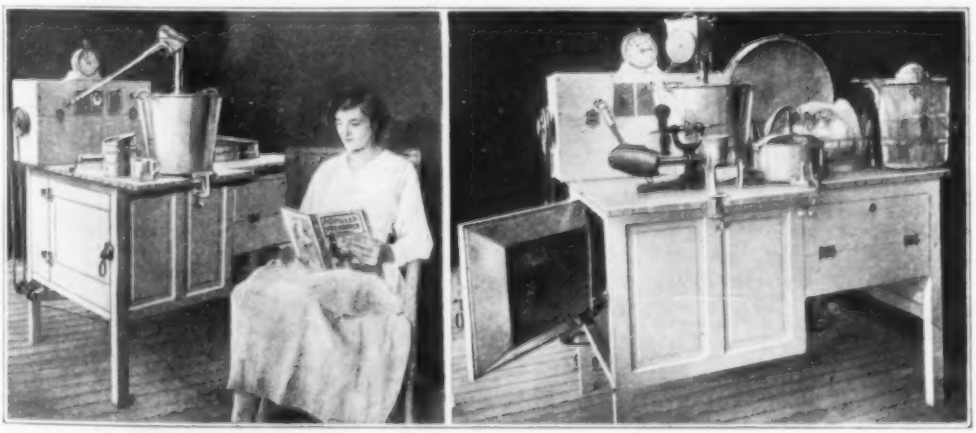
Tractor at a Country Fair with Front Wheels Cramped by Means of a Wire so That It could Run in a Circular Path without a Driver

TRACTOR RUNS DRIVERLESS FOR FIVE DAYS

An exhibitor of a tractor at a country fair succeeded in attracting more than the usual amount of attention to his machine by holding its front wheels in a cramped position by means of a wire and allowing it to run five successive days without a driver. Hour after hour it traveled around a beaten circular path without human guidance. As a result, the name of the machine and its ability to turn around in a small area were brought to the attention of many who otherwise might never have observed the exhibit.

ELECTRIC KITCHEN TABLE LESSENS DOMESTIC WORK

To the servantless housewife an electrified kitchen table offers inestimable convenience. One recently designed embodies a number of real labor-saving features that will appeal to most women who do their own work. Housed in a cabinet at the top is a small motor that drives various appliances through flexible shaft and belt connections. A closed compartment provides storage space for the utensils at the times they are not in use. When a food chopper, bread mixer or kneader, or ice-cream freezer is to be employed,



Showing the Electrified Kitchen Cabinet in Use: At the Left, Bread is being Mixed, While at the Right a Food Chopper is Shown Connected, and the Dishwasher with Some Other Appliances Are Visible

it is fastened to the table top by means of clamps provided for the purpose, and connected with the motor. Pressure of a button accomplishes the rest. A clock breaks the circuit at the desired moment, so that constant attention to the work in hand is not required. At the right end of the table is a built-in dishwasher which practically eliminates what usually is the most disagreeable part of kitchen work. Silver-polishing equipment, an emery wheel, and similar accessories are also included in the outfit.

WIND SWEEPS OBSERVATION STATION FROM PEAK

Complete destruction of the government's lookout station on Strawberry Mountain, Malheur National Forest, has been reported. The house was built by rangers during the summer of 1916 and, although of part steel construction, it proved incapable of withstanding the heavy winds of the following winter. It stood at an elevation of about two miles on the pinnacle of one of the highest peaks in eastern Oregon. Weeks of difficult and dangerous work, and considerable money, were spent in establishing the post, which was thoroughly equipped with weather-recording apparatus and fire-finding instruments. The building was 12 ft. square, surmounted by a lookout tower of half that size, and glazed on all sides. During the past winter observers discovered that the station was no longer visible through binoculars. That led to the belief that heavy snows had entirely covered it. The coming of warm weather, however, showed this to be a mistaken assumption. All that could be found of the building, when the peak was scaled, were twisted pieces of steel scattered along the slopes. Apparently the structure was destroyed by a cyclone.

¶Customs officials in New York recently discovered that some wire nails in a large lot consigned to Sweden were provided with lead caps. This fact has aroused the grave suspicion that lead secured in this manner might really be destined for Germany.

The Station as It Appeared Shortly after Completion: It Occupied the Topmost Pinnacle of One of the Highest Peaks in Eastern Oregon

Forest Rangers Breaking a Trail through the Mountain Snows and Driving the Pack Train to the Summit: The Work was Undertaken Late in the Summer and was Attended with Much Difficulty and Some Danger

Right: Pack Train Arriving at Mountain Summit with Material and Men for Erection of Government Lookout Station and Weather Observatory

HIGH-SCHOOL GIRL MAKES OWN PLEASURE BOAT

An Inviting Rowboat and Its Builder: The Craft Is 15 Feet Long and is Fitted Up Ingeniously for Long River Journeys

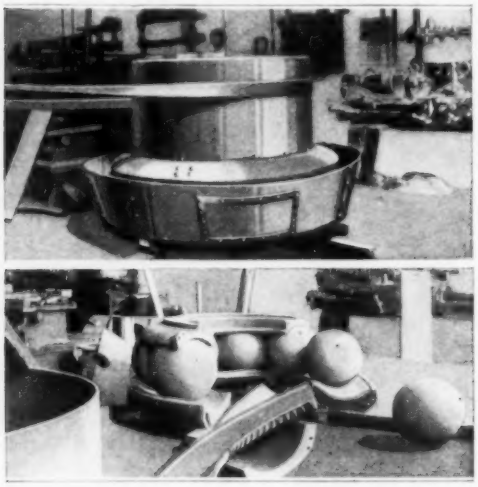
The Feminine Boat Builder Ready for an Outing in Her Own Craft

By the building of a handsome rowboat in which she and her chums have taken delightful river trips, a high-school girl, who prefers manual training to domestic science, has attracted more than local attention. The trim little craft which was fashioned by her own hands is quite original in design and furnishings. It is 15 ft. long, has a 40-in. beam, and is 18 in. broad at the ends. A daintily scalloped awning, supported by four posts, gives the boat a touch that is quite feminine. By careful planning, available nooks and corners in the shallow body have been utilized to excellent advantage. Under the seat in the prow is a clothes-press and beneath the middle seat is a place for provisions. Built into the stern is a water cooler consisting of a galvanized tank, with a spigot, incased in wet sawdust. An automobile lamp serves as a searchlight, and inner tubes are carried as life preservers. The seats have adjustable backs, and the bedding may be used as cushions.

BALL MILL OF NOVEL TYPE BUILT IN SECTIONAL FORM

At some of the western mines a new type of ball mill for crushing gold ore has been installed. Certain engineers who have seen the equipment in use have indicated that it is as efficient as it is novel in design and operation. To facilitate its transportation to remote places difficult of access, the unit has been built in sections which are easily handled and assembled. In shape the mill is circular and, in one size, about six feet in diameter. A steel groove encircling the basin holds seven chilled-iron balls that are 16 in. in diameter and weigh 500 lb. each. An inverted groove, similar to the aforementioned one, rests on top of the balls and encompasses the cylindrical upper section of the mill, to which the driving power is transmitted by a broad horizontal belt. A 10-hp. motor

gives the mill about 50 revolutions a minute and at that speed, it is claimed, two tons of ore can be handled hourly.

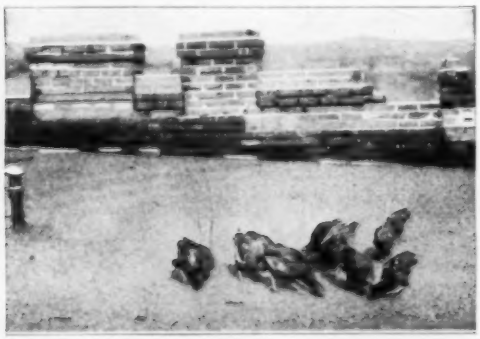


At the Top the Mill Is in Operation, While Below It is Disassembled to Show the Arrangement of Some of Its Parts and the Size of the Balls Used

Since there are no shafts, boxes, or bearings, there is little to get out of working order. Provision is made for the quick renewal of worn parts.

CHICKEN YARD ON HOTEL ROOF A SUCCESS

A few months ago a hotel manager in a large city was presented with a crate of young chickens by relatives in the country and, instead of killing them, he decided to utilize the gravel roof of the hotel as a poultry yard and raise the little flock. The fowls have thrived in their lofty home and seem altogether satisfied to scratch for food that is scattered upon the gravel of the roof. It is asserted that the rooster's early-morning call, when delivered from certain points of vantage, has not been without its beneficial effect on guests who are late risers. The owner has considered increasing the size of his flock.



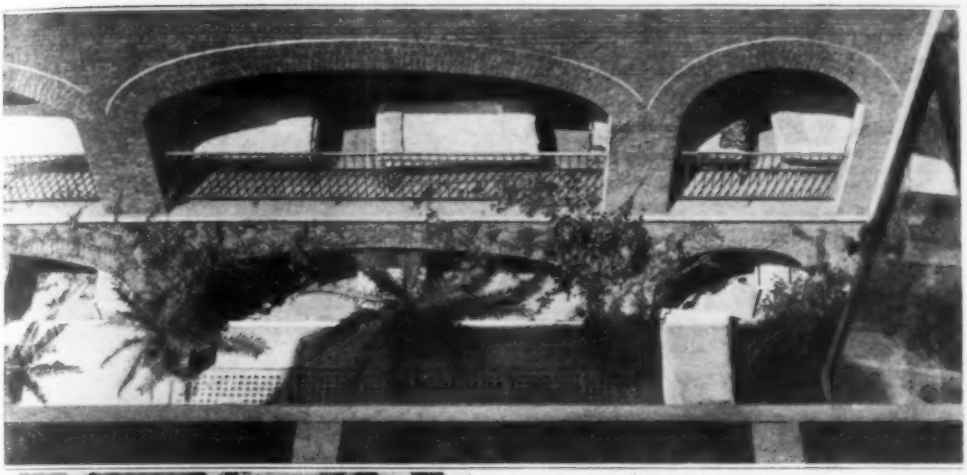
A Flock of Chickens Which have been Confined for Some Weeks on a Hotel Roof and have Thrived

JUNIOR RED CROSS FORMED FOR SCHOOL CHILDREN

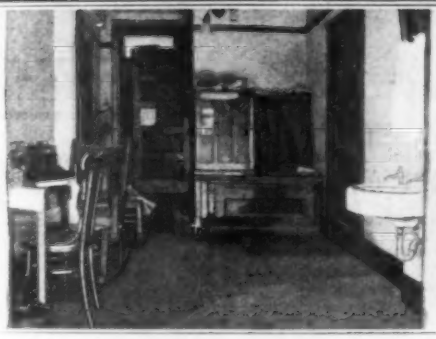
The children of the United States are to share in the great war, not in the fighting forces, of course, but in a very vital way nevertheless. With the approval of the president, the Red Cross has undertaken the organization of the country's millions of school children into the Junior Red Cross. Among the tasks they will undertake, under the guidance of their teachers and others, are the making of knitted articles, saving of garden seed for use in rehabilitating France, making cretonne rest pillows filled with snippings from odds and ends of material, making crutch pads of unbleached muslin, and the saving of tin foil, old kid gloves, etc., to be sold for the benefit of the Red Cross fund. In an executive message, which is unusual in that it is addressed directly to the children, the president says: "It will teach you how to save, that suffering children elsewhere may have a chance to live."

PORCH BED IS CONCEALED IN ROOM DURING DAY

By means of unusual features in plans and furniture, narrow balconies are made available as sleeping porches for occupants of a large Y. M. C. A. dormitory. Each of the rooms in question is provided with French windows opening onto a narrow, railed porch, and is furnished with a bed mounted on wheels so it can be drawn out on the balcony when desired. Beneath a closet and wardrobe in one corner of each room is a low recess in which the bed is usually concealed during the day, the head of the bed being in the



Above Is a View Looking Down on the Balconies Which Serve as Sleeping Porches in a Y. M. C. A. Building. Usually the Beds are Kept in the Rooms during the Day



View of One of the Bedrooms as It Appears in the Daytime: The Panel beneath the Wardrobe in the Far Right-Hand Corner Is the Head of the Bed

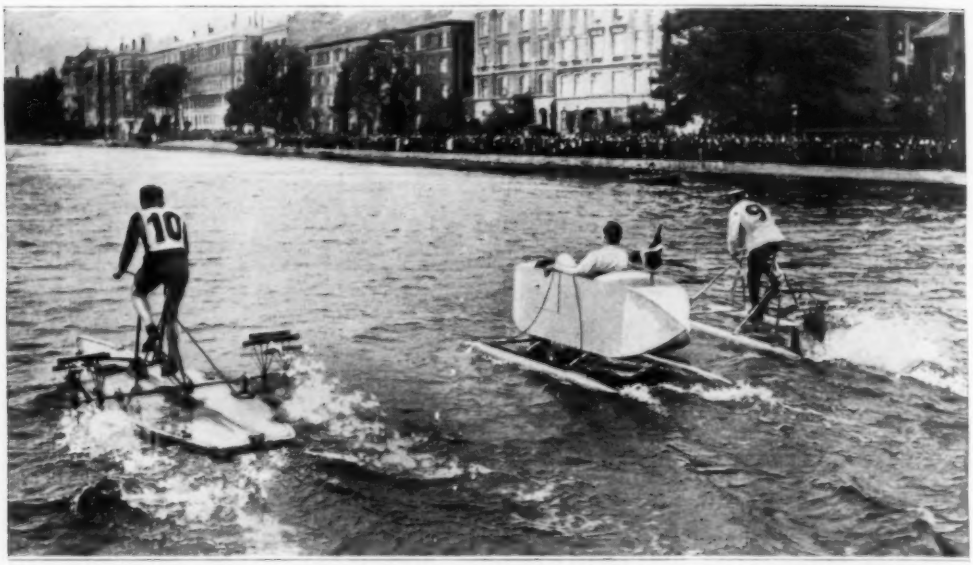
form of a panel which completely closes the entrance to the recess. This arrangement provides the equivalent of an attractive living room for day use and an open-air sleeping apartment at night.

HOTELS URGED TO FREEZE FRESH VEGETABLES

Restaurant and hotel owners who have facilities for freezing and cold storage have been advised by specialists to freeze fresh vegetables and berries to preserve them for winter use instead of canning them. This would somewhat relieve the canning plants which are under unusual pressure this season. Among the articles which are said to have been kept successfully by freezing are sweet corn on the cob, string beans, lima beans, beets, asparagus tips, peas in the pod, parsnips, and spinach. Among the fruits are strawberries, gooseberries, cranberries, blueberries, currants, plums, and cherries. These foods, when preserved by freezing, should be used within a few hours after being thawed out.

DEVICE PREVENTS FOLDING OF FLAG ABOUT STAFF

A good deal of annoyance is often caused by a flag wrapping itself around the staff when the emblem is displayed from a window or doorway with the pole in a horizontal position. This difficulty is overcome by attaching to the emblem a light metal rod provided with a clamp at either end. One clamp fastens to the corner of the flag next to the end of the staff and the other clamp to the edge of the cloth about midway between the ends. This prevents the banner from folding itself about the pole and, at the same time, permits it to wave freely.



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ODD CRAFT RACE ALONG THE STRANDVEI AT COPENHAGEN

WHEN the annual water carnival was held recently at Copenhagen, many strange-looking craft took part in the racing events. The picture presented herewith shows a few of the queer contrivances skimming along the water before immense crowds lining the Strandvei. The two outer entries are alike in that they are equipped with bicycle frames and gearing and propelled by paddles. One of them, it will be noticed, is a side-wheeler, while the other, of pontoon construction, has a single wheel at the stern. The craft in the middle is built on pointed air cylinders and provided with a more or less streamline body. The festival, always a popular event, was attended by the Danish royal family.

CLIPPING MACHINE A BOON TO RED CROSS WORKERS

Women in Red Cross groups who have blistered their hands making clippings from cloths with which to fill fracture pillows for our army hospitals will welcome a new machine that clips about eight times as fast as a person can with a pair of shears. It is provided with four knives, mounted like the spokes of a wheel, which are turned on an axis by means of a handle. As they revolve they pass a stationary blade across which torn strips of the proper width are fed by means of two rollers. By means of a clamp the cutter can be securely fastened to the edge of a table.

WAR AIDS LEAD-PENCIL INDUSTRY IN JAPAN

The war has proved a great stimulus to the production of lead pencils in Japan. During the last quarter of a century that country imported these articles in increasing amounts, until in 1911 the total for the year was 65,000,000 pencils, most of which came from America and Germany. But with the opening of the European conflict German sources of supply were cut off and native manufacturers, who had been producing only in comparatively small quantities, seized their opportunity and made the most of it. In 1914 Japan exported over 9,000,000 pencils and in 1916 the number had increased to 168,000,000. There is strong indication that many of the markets won by the orientals will be held by them after the war, for they have the advantage of very cheap labor. Most of the lead which they use is imported from India and this country.

COMMENT AND REVIEW

Universal Military Training

RECENTLY motoring through a small seaport town, I stopped to watch a fire which had already gained considerable headway in a large warehouse which was built upon a dock, near the main business street. The local fire department, a volunteer organization common to places of that size, made its first appearance 15 minutes after the fire was well under way. Its members came from offices, stores, workshops, and their homes. None was in uniform; some were bareheaded and coatless. The water supply was inexhaustible, the apparatus fairly good, what there was of it, but a second trip had to be made before enough hose was available to reach the fire. There was the usual crowd, with the usual excited efforts, everybody wanting and trying to help, and working at cross-purposes and in each other's way. A small gale was blowing, and for a time it seemed as though the town was doomed. Then suddenly the wind shifted, and though the warehouse and all its contents were destroyed, and a good part of the expensive dock, the fire eventually burned itself out.

We in this country have the greatest property in the world. We have built up and accumulated with an energy, and daring, and effectiveness, such as no other nation has ever displayed. And we have done it all under conditions of personal liberty and opportunity far more priceless than all our material wealth. But what of our foresight in safeguarding all these? Since our armies disbanded at the close of the Civil War, up to the present moment, we have, comparatively speaking, been far less prepared for a world conflagration than the little seacoast town with its dock fire. We cannot, must not, rely upon some hoped-for shift in the wind, when enemy countries threaten to consume us.

For three years past we pursued our daily walks in the false belief that if that impossible time ever came, we would spring to arms overnight. Millions of otherwise sane thinkers really believed this. Today we know the truth. A modern army—and none other has the slightest value—can no more be produced in a day, or week, or month, than a crop of corn or wheat. On proper provocation 10,000,000 men would spring to arms between sunrise and sunset, but they would be a mob, not an army.

World life has changed; the volunteer system—always most unfair—is obsolete; as obsolete as the whale-oil lamp compared to the electric light, the messenger to the telephone, the oxcart to the limited express. If we are to continue our existence as a free people we must modernize our system of national protection, and that means universal military training. The greater our abhorrence of war, the greater reason for equipping ourselves to avoid it. The thief and slugger and assassin seldom attempts his wickedness in the presence of an officer of the law. Other nations will hesitate to attack us if we are thoroughly prepared; and as the policeman has no use for his club and gun in the presence of only the law-abiding, so we, too, would never use our military arms except in self-defense.

Last April there was introduced in the Senate, the Chamberlain bill. Briefly, it provides for six months' intensive military training for every young man: in the first year of the act, of those between the ages of 19 and 23, inclusive, and thereafter on reaching the age of 19. If temporarily exempted, then the training can be taken up to and including the age of 26. Exemptions provide for those who are members of the permanent military or naval forces of the United States; persons physically unfit for any military or naval service whatever; persons on whose earnings a father, mother, brother, sister, wife, or child is wholly dependent for support. Members of a religious sect whose creed forbids the bearing of arms will not be trained in the bearing or use of arms, but will be trained in some noncombatant branch of military or naval service. As far as practicable, the person will be assigned to train in the department and branch of the service of his choice. The expense of transportation to and from the place of training, and subsistence, clothing, and medical attendance while there, will be paid by the government. Having completed the training, each person will receive a certificate and rosette.

It includes every young man, rich or poor; there is to be absolutely no substitute or subterfuge; all will be treated exactly alike. Provision is made

for the separate training of the vicious and criminal. The result of the recent draft has already shown conclusively that an average increase in efficiency, physical and mental, of at least 25 per cent can be secured through this training. That alone is sufficient to warrant the plan, for what a tremendous asset to the country does 25 per cent added efficiency mean! It will teach respect for authority without incurring vassalage; it will serve as the great refiner of what the melting pot has already produced. It will create self-respect where self-respect does not exist; it will teach love of country where it is weak or wanting. The period, six months, is no handicap and does not interfere with the learning of a trade, or a college course. Records show such a training as is contemplated actually increases the length of life of the average man by five years. Ample provision is made to surround the training camps with even greater safeguards, moral and physical, than exists in the life of the boy living at home.

Aside, therefore, from all questions of necessity, the undertaking has everything to recommend it, as a means to making Real Americans and Real Men.

Cut Out Study of German

DOES it not seem a bit inconsistent to teach the German language in our public schools? Why should we require our boys and girls to spend months in learning a language which is the language of a nation with which the world is at war, and, whatever of literature and science it once stood for, is now the language of hate? And why teach German and not Scandinavian and Bohemian, Russian, Japanese, Spanish, and Polish? French is a more polished language, and Italian is a tongue of art and opera. Is it fair to the millions of our taxpayers who came to these shores from other lands than Germany, to pay tribute that the language of any other foreign country than their own native tongue be taught in public schools? There are riches in German literature it is true; the medical and scientific works in German contain much of value to future writers, doctors, and chemists, but the proportion of these three to the whole number of scholars is very small. The study of German properly belongs in colleges and universities, and even there it is in most cases, if not all, now made an optional study. The small number of our boys and girls who enter high schools, and the still smaller number who go on to college work, make it imperative that the few years of study possible to the great majority should be devoted to necessary practical studies, including a better knowledge of our own country and its government, city, state, and national. Far better might the time spent in the study of German be devoted to that largely neglected and old-fashioned accomplishment of learning how to spell correctly.

Now is a good time to cut out German from our public schools, and use the time in a better study of that language in which was penned the Declaration of Independence.

Made-in-Germany Goods

AND why, also, when the time comes that merchant ships can again sail the seas in safety, and the several thousand vessels flying the German flag seek foreign shores loaded to the guards with goods of German manufacture—why then should the nations of the world buy the German exports? One surely cannot expect the mothers in England, France, Australia, and Canada to buy and wear garments made by the very hands which dropped bombs on the hospital in which lay their wounded sons! To do so would be sacrilege. And why should we in this country, whose women and helpless children went down on the "Lusitania," whose sons and brothers and fathers are already near or on the firing line—why should we forget all these things in days to come, and exchange our gold for German-made goods merely because they are offered us for a little less money than the same articles can be manufactured here? And why should the South American countries encourage imports of German goods when by doing so, every dollar serves to strengthen the arms of a nation which would crush them all in its plan of world dominion?

Why should India, and Japan, and China, help rebuild an export trade, the rapid growth of which, and whose enormous profits, fed the fires of avarice with the dream of controlling the factories and workshops of the whole world?

The very money which for years has flowed into Germany from France, and England, and Italy, is this very moment going back to them in the form of deadly gases and monster shells, and all the hideous implements of which the Huns are proud. Money which this country exchanged for German goods is being spent on our own soil in a propaganda by which hate, distrust, and maliciousness are planted and nurtured. Our own dollars were and still are being spent to foment hate between this country and Japan, and Mexico; it was some of our own money which paid for dishonor of the Bernstorff type; which has blown up our mills and ships and docks; which has made the I. W. W. what it is. Shall we then in time resume the exchange of our money to a foe who will ere long approach us with smiling face and explain no harm was meant when he stopped at no barrier and recognized no code of faith or morality? Will we be so craven as to forget all this? Or will we demand that Congress pass a law requiring that every article imported into this country shall (under penalty of confiscation) be plainly marked, showing the country of its origin? And then may all good Americans show their loyalty and never hesitate one instant between going without an article or buying one bearing that mark of iniquity "Made in Germany."

Lasting Peace or None

A FASCINATING sight it is, to stand on the seashore and watch the ebbing tide. Each succeeding wave recedes just a little beyond its predecessor, yet compared with a half hour before, great stretches of beach are revealed which were recently submerged. Compared with two years ago, one year ago, six months ago, six weeks ago, the tenor of the German war office has receded. It has not gone very far at that, and the boat which in fancied security drops anchor at this stage will find itself in a short time stranded on the beach. The tide must ebb a long way yet before low-water mark is reached.

Our ocean frontage extends over 5,000 miles, with countless bays and coves, inlets and river mouths. All of these are carefully charted, the result of two centuries of patient sounding and survey. With these charts the navigator may cruise for the first time along the coast, or into harbors where he never sailed before; and in confidence and safety, for on these charts is set down the depth of water at low tide. With sufficient water at low tide, he can disregard any other stage.

There are now unmistakable signs that Germany's tide, which four years ago burst upon Europe with the suddenness and intensity of a tidal wave, has begun to ebb. Its high-water mark has been reached. Like the tide, it could not remain always at that point. The ebb was inevitable. It has already begun. As yet it is slow, just as the recession of a tide is at first almost imperceptible, but the ebb flow has begun. It is ours and our Allies' to follow that ebb steadily and resistlessly, until it has reached the low-water mark. And having reached its lowest point, then will be the time to make charts which may serve through future generations as guides by which the nations of the earth may pilot their ships of state in safety and security.

And not before.

An Unpatriotic Congress

CONGRESS has at last adjourned and its members are now at home, "mending fences" where some other aspirant for congressional honors has been ingratiating himself with the voters. The voice of the congressman will be heard in places where men congregate, in hall and park and picnic wood. He will wave the "Dear Old Flag" in a fervor of emotion; he will thrill his hearers with the story of our destroyers as they fight the deadly submarine; he will paint a glowing picture of great battleships from whose mastheads fly the Stars and Stripes, as they convoy our soldiers and munitions through the danger zones; he will recount the assembly of our thousands of young men, the flower of the land, as they fill great cantonments created as by magic; he will

fill the heavens with an imaginary fleet of air craft, so great as to darken the very sun; he will appeal to fathers to exhaust their last dollar in the furtherance of this holy war; and exhort mothers, wives, and sweethearts to rejoice in the sacrifice of their most precious of all earthly possessions. Tears even will fill his eyes, and his voice will grow husky and fade away into breathless silence like a dying sunset on a lofty mountain top.

All this will he do. And the band will play "My Country, 'tis of Thee."

But when the war tax is paid next June, he will not pay his part, for he has voted to exempt himself.

Oh, patriotic congressman!

H. H. WINDSOR

October 25th.

LARGE PLANER CONSTRUCTED FOR USE AT NAVY YARD

Seven railway cars were recently required for transporting an enormous planer across the continent to the Mare Island Navy Yard where it is to be used in the construction of battleship turbines. Among other things, the machine is interesting because of its size and weight. It occupies a space 25 ft. wide and 80 ft. long, and has a height of about 19 ft. Its weight aggregates approximately a half million pounds. A 100-hp. motor is used in operating it. Engine castings 35 ft. long, 15 ft. wide, and 9 ft. high will be handled.

Showing the Big Planer Assembled at the Factory Where It was Erected: Obviously It had to be Completely Dismantled for Shipment

FREE SCHOOL FOR RADIO OPERATORS IN BOSTON

With the passing of the first congressional appropriation for a merchant marine it became apparent to men interested in the subject that there would be a large demand for radio operators when the new vessels were completed. With this idea in mind, two radio inspectors in Boston have been instrumental in establishing a free wireless school under government auspices. The promoters' resources were limited and they were compelled to rely for the most part on donations or loans of material and apparatus from various sources, such as the Bureau of Navigation, a wireless-telegraph company, and Boston authorities. Facilities for instructing 40 men have been acquired and classes enrolling almost that number meet three nights a week.

MARBLE MEMORIAL BUILDING TRIBUTE TO McKINLEY

Thousands of Persons Attended the Dedication of the William McKinley Memorial Building at Niles, Ohio, a Few Weeks Ago. The Picture Above Gives Some Idea of the Appearance of the Edifice

The Marble Statue of McKinley, Which Occupies the Central Position in the Court of Honor at the Entrance of the Memorial Structure

Workmen Spent Six Months in Quarrying and Finishing This Massive Roof Stone. The Building is Situated in a Small Park in the Heart of the Town Where the Late President was Born

Men of international prominence participated in the dedication of a magnificent memorial building that has been erected as a tribute to the late President William McKinley at Niles, O., his birthplace. Thousands of persons attended the exercises, which were made particularly interesting by the unveiling of J. Massey Rind's new marble statue of the deceased executive. The work occupies the central position in the Court of Honor at the entrance of the structure. It is 12 ft. high and weighs approximately 35 tons. The building is situated in a small park near the middle of the town. It is constructed of marble and is 232 ft. long, 136 ft. in depth, and 36 ft. high. The interior plan includes an auditorium, a library, a museum, Grand Army rooms, and other space to be used for educational purposes.

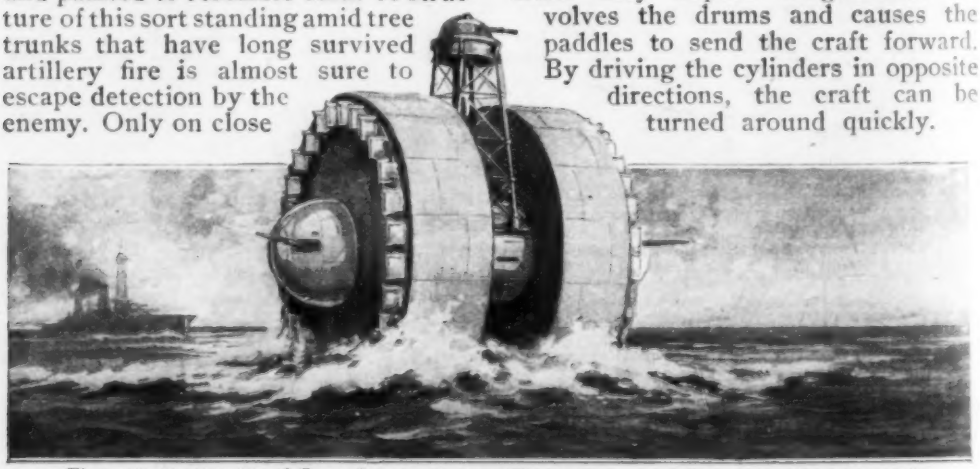
OBSERVER'S POST OF SHEET METAL RESEMBLES TREE

Observation posts made of lumber and sheet metal to look like tree trunks are among the latest disguises employed on the battle front to deceive the enemy and enable watchers to occupy positions of advantage. About a tall framework of wood not much larger in diameter than the body of a man is placed a sheath of sheet metal, pressed and painted to resemble bark. A structure of this sort standing amid tree trunks that have long survived artillery fire is almost sure to escape detection by the enemy. Only on close inspection does one discover the seams that mark the overlapping of the metal sheets.

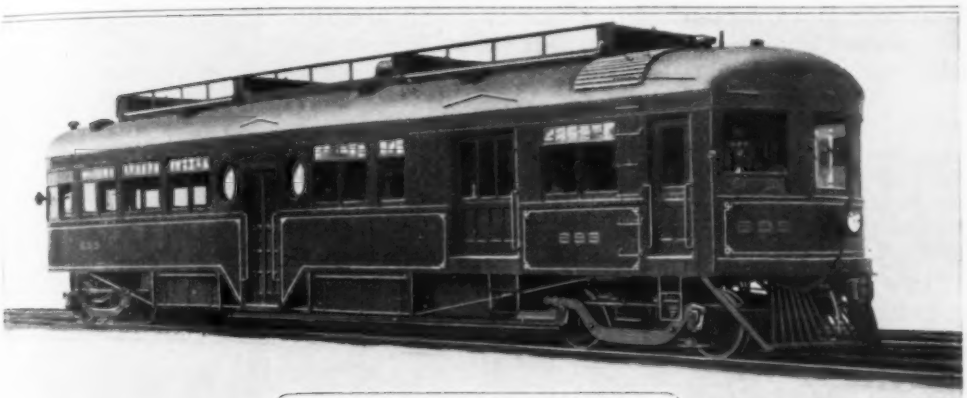
In the Center of This Picture is Shown a Battle-Front Observation Post Made of Sheet Metal and Lumber, Cleverly Fashioned and Colored to Resemble a Tree Trunk

ROLLING "TANK" OF THE SEA SENSATIONAL WARSHIP

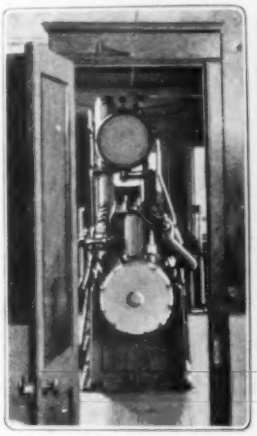
Plans for one of the strangest war vessels ever proposed have been submitted to the Council of National Defense. The craft is an enormous ocean-going water wheel that is intended to perform much the same service for the navy as the British and French "tanks" have for the allied armies. It has been conceived as an offensive machine for assisting landing parties in coast attacks. Although highly visionary and entirely untried, it has novelty and potential power that draws attention. In addition to being amphibious to a certain degree, it is theoretically capable of great speed. Essentially it consists of two big connected cylinders that are supplied around their outer rims with adjustable paddles. The horizontal axis offers space for a crew and is gyroscopically stabilized to support a fighting mast. Opposite ends of the axis are utilized as gun turrets. Powerful motors mounted on heavily weighted sliding platforms in the lower part of each drum engage cogged rings encircling the inner circumference of the cylinders. In tending to climb the latter they impose weight that revolves the drums and causes the paddles to send the craft forward. By driving the cylinders in opposite directions, the craft can be turned around quickly.



Theoretically Capable of Great Speed, the Sea "Tank" Represents One of the Most Unusual War Vessels Yet Proposed



Showing the Exterior Appearance of the New Oil-Electric Motor Car Recently Built for the Nashville, Chattanooga & St. Louis Railway



Left: Looking Forward from the Passenger Compartment into the Engine Room, Showing the Power Plant. Right: The Seating Arrangement and the General Interior Plan Are Similar to Those of Electric Interurban Cars

RAILWAY USES NEW MOTOR CAR FOR BRANCH LINE

To reduce operating costs on branch lines that have light passenger traffic, the Nashville, Chattanooga & St. Louis Railway has put in service an oil-electric motor car that is of late development. The points of chief interest are found in the power plant. Kerosene is converted into a fixed gas and fed to a 150-hp. marine-type engine that uses a mixture of one part fuel and six parts air. A 250-volt direct-current generator is turned at a constant speed of 1,000 revolutions a minute and delivers unused energy to a storage battery. The latter is able to supply 400 hp. for a five-minute period or 93 hp. for an hour, and automatically assists the generator when the car is accelerated or heavy grades encountered. The battery also supplies energy for the lights and starter and in addition is an auxiliary source of power in the event of engine trouble. For a limited period, it will drive the car at a speed of about 30 miles an hour.

LONDON USES SOUND BOMBS AS AIR-RAID WARNING

The London authorities have recently begun using sound bombs, or rockets, as a means of warning the populace of approaching air raiders. These bombs consist of cylinders about eight inches long, weighing 1 lb. each, which are fired from small mortars by

pulling a lanyard attached to a fuse at the nose. They rise some 300 feet in the air. More than 200 of them were

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Firing One of the Sound Rockets Recently Introduced to Warn London of Approaching Air Raiders

sent up from 79 fire stations the first time they were used and the result was pronounced very satisfactory. The public was informed about the rockets in advance so that the significance of the peculiar sound which they produced was understood.

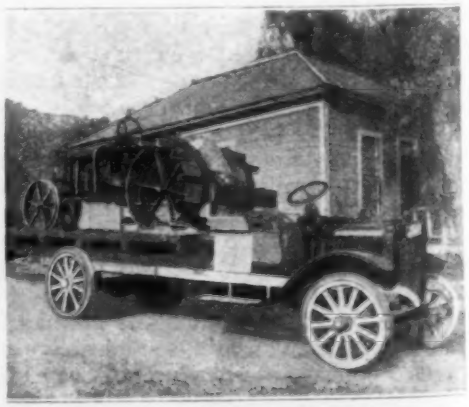
TEST AEROPLANE ENGINES IN VACUUM CHAMBER

The government's recent activity in producing new aeroplanes lends special interest to a small building on the Bureau of Standards grounds in which is a vacuum chamber for testing aeroplane engines. In this room, measuring 6 by 6½ by 15 ft. and having 12-in. concrete walls, various atmospheric conditions similar to those found in altitudes up to 20,000 ft. and higher, can be reproduced for the purpose of ascertaining how a motor will act when driven swiftly or slowly to various heights. Undoubtedly the new "liberty" motor, of which so much is expected in the war, was tested in this or a similar chamber.

Not only is apparatus provided here for reducing the pressure as desired, but arrangement has been made for the exhaust of the engine and for discounting the heat which would be dissipated during actual flight. In the building inclosing the testing compartment are many pieces of apparatus for measuring heat, air pressure, and the volume of air used by the engines.

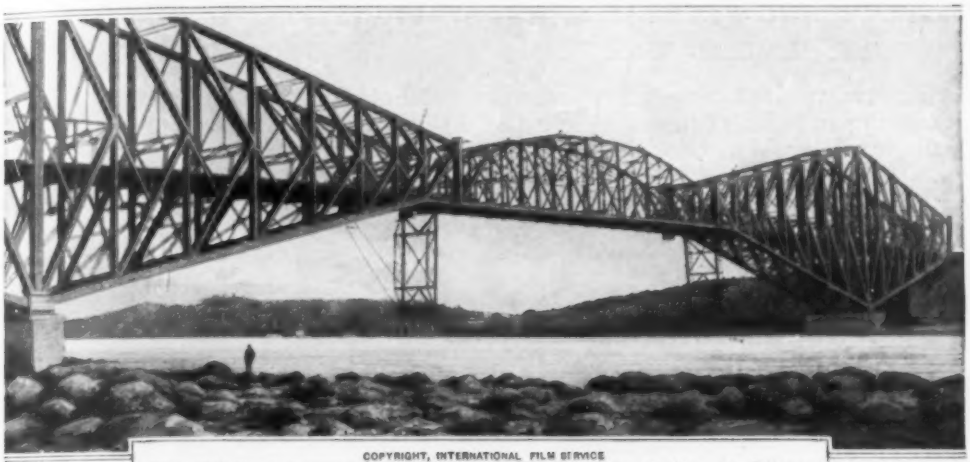
NO LOST TIME IN PROGRAM OF THIS TRUCK SELLER

There is so little waste time in the schedule of a certain truck and tractor salesman that his methods should delight the most exacting efficiency expert. This energetic man drives from place to place in one of the trucks which he is selling and since his machine is well loaded, he is ready at all times to demonstrate its capacity for service. The load consists of a tractor for which he also takes orders. With this double outfit he is able to make his trips count to the best advantage, visits to several prospective buyers of one or both machines being possible within a short time. Two heavy planks are used as inclines down which the tractor can be driven from the truck under its own power.



Salesman's Double Demonstration Outfit: While Carrying the Tractor to a Farm Where It is to be Tried Out, He Is Able to Display the Merits of the Truck, for Which He Also Takes Orders

QUEBEC BRIDGE BUILDERS TRIUMPH AT LAST



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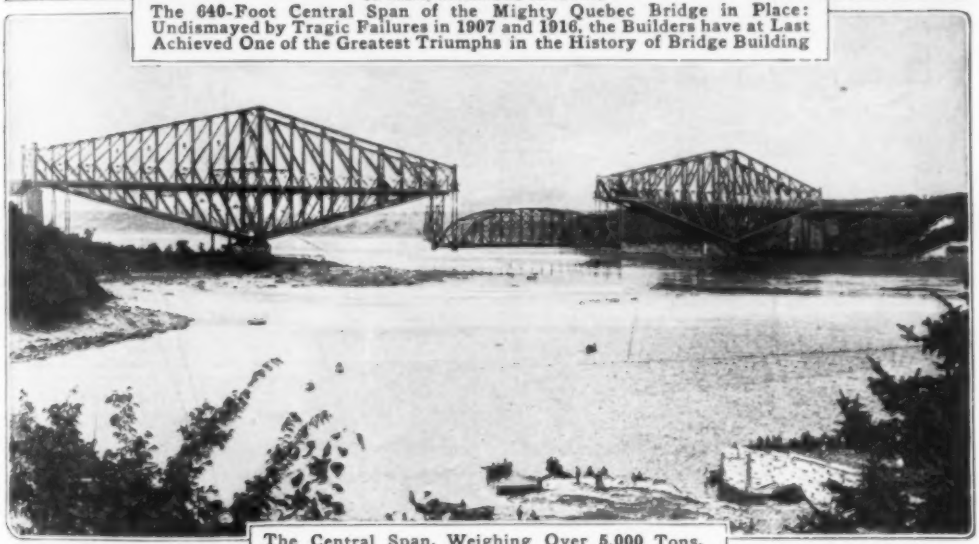
The 640-Foot Central Span of the Mighty Quebec Bridge in Place: Undismayed by Tragic Failures in 1907 and 1916, the Builders have at Last Achieved One of the Greatest Triumphs in the History of Bridge Building



The Central Span, Weighing Over 5,000 Tons, being Raised by Practically the Same Method as was Employed Last Year, with Certain Added Precautions

Ready for the Hoist of 150 Feet: The Span is About to be Lifted from Its Pontoons by Means of Hydraulic Jacks and Chains, Composed of Massive Bars of Steel. The Raising Occupied Practically Four Days

RALPH MODJESKI, ENGINEER

BUCKLING FREIGHT CAR CAUSES ODD WRECK

The tremendous cumulative force of a moving train was illustrated in a peculiar wreck which occurred in Newburgh, N. Y., recently. As a result of suddenly applying the air brakes to a line of some 75 empty cars, those in the center were caught between one section of the train which was still moving under its own momentum and one section that had been brought to a quick stop. Under this strain a stock car buckled and was broken in two, the body being torn from the front and rear trucks, which were jammed against one another. By coincidence this car was passing beneath a trestle when the crash came and part of the wrecked mass was forced up against this overhead structure. In spite of the smash-up the wheels did not leave the rails.

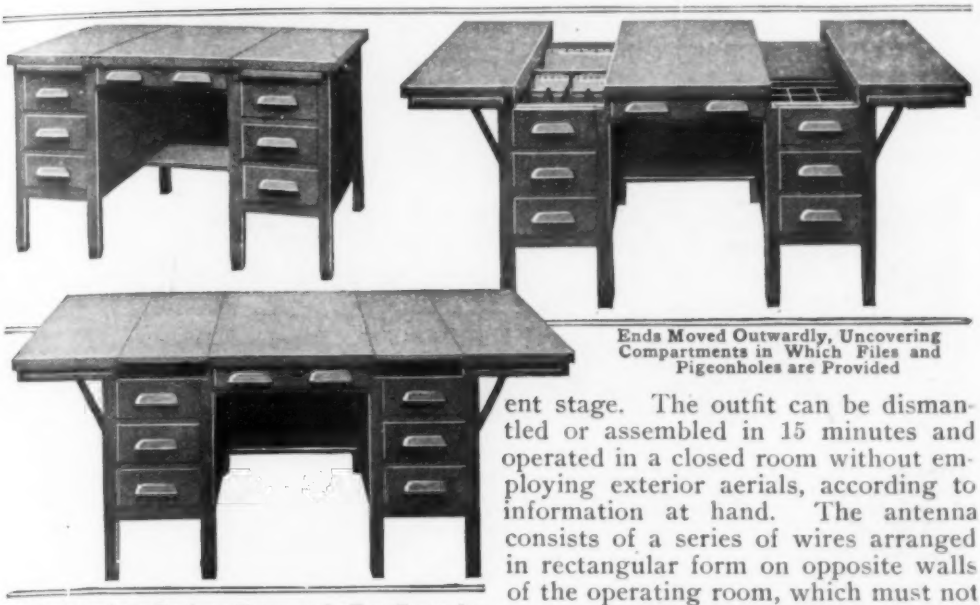
Stock Car Which Buckled beneath a Trestle When the Brakes were Suddenly Applied to the Train, Subjecting This Car to Too Great Pressure at Either End

PRINT PHOTOS ON SILVER BY SECRET PROCESS

Photographs which are printed on silver plates instead of paper and are practically indestructible are now being produced by a chemist who has been working five years to perfect his invention. The chemical formula used in making the likenesses is a secret. A remarkable feature claimed for the new pictures is that the impression of each seems to penetrate the silver so that if the printed side of a plate is ground down on a buffing wheel the picture is not obliterated but shows on the new surface. In some instances, too, the natural colors of the objects photographed, such as pink and blue, have appeared on the plates, but the inventor is not able to explain this phenomenon nor can he always reproduce the colors when he wishes. Other uses of the new discovery having far-reaching possibilities are suggested by the fact that with this process portraits can be made on plate glass, and invisible impressions can be made on glass which can only be brought out by use of the secret solution.

CONVERTIBLE OFFICE DESK SERVES DIFFERENT NEEDS

In a flat-top desk have been incorporated the features of a filing cabinet, a directors' table, and a roll-top desk. The top is divided into three sections. The middle one is the largest and connects the pedestals, while those on either side of it are counterbalanced



Ends Moved Outwardly, Uncovering Compartments in Which Files and Pigeonholes are Provided

When Closed, the Desk, as Shown at the Top, Conceals Its Character. Below It is Shown Opened as a Directors' Table

and arranged to slide outwardly and expose two compartments supplied with letter and card files and inclined pigeonholes. When desired, the arm rests may be inserted in the openings thus formed and a six-foot directors' table provided. To make the changes, the top can be opened or closed almost as easily as a drawer.

DELICATE RADIO RECEIVER HAS STARTLING FEATURES

For more than a year complete secrecy has shrouded the technical details of a highly sensitive radio receiver that is understood to be of remarkable character. It was originally designed for commercial purposes, but before being publicly announced gained the scrutiny of the Navy Department. Coincident with our entrance into the world war, the invention was turned over to the government. Whether actual use is to be made of it remains to be seen. The instrument is intended for long-range receiving and at a distance of 3,000 miles succeeded in picking up signals from Panama even before it had been perfected to its present stage. The outfit can be dismantled or assembled in 15 minutes and operated in a closed room without employing exterior aerials, according to information at hand. The antenna consists of a series of wires arranged in rectangular form on opposite walls of the operating room, which must not be in a building of steel construction. The wires, if desired, may be concealed from view.

COMFORT AND GRACE MARK WOMAN'S MOTOR OUTFIT

In the striking woman's motor costume shown herewith, the use of Morocco leather as the principal material, and ample provision for the warmth and general comfort, have not prevented the maker from producing an outfit whose lines and general appearance are genuinely feminine and graceful. This in spite of the fact that the coat is cut man-fashion and the bifurcated skirt has been gathered about the ankles like breeches. The low-heeled comfortable shoes are a detail not determined by accident. Such a costume is suitable for flying and motorcycling, as well as automobiling.

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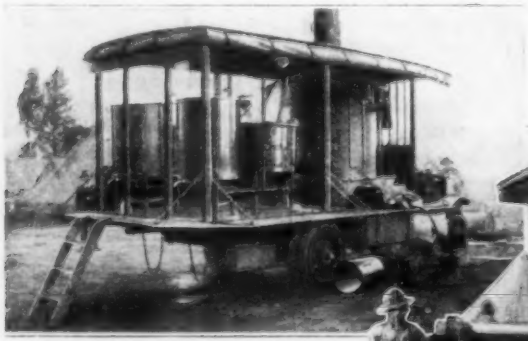
OVERTURNED POT OF OIL DESTROYS SALONIKI

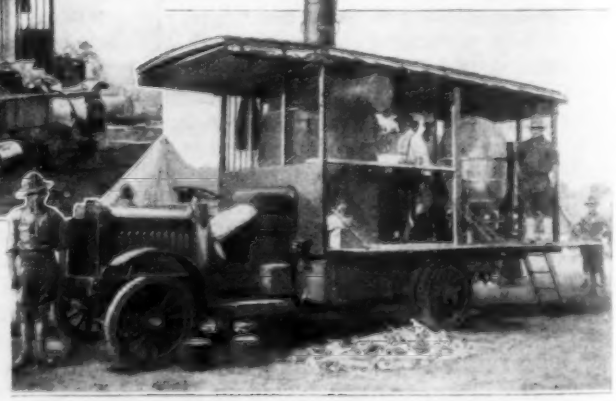
SALONIKI, known to travelers as one of the most interesting and metropolitan cities of the Mediterranean, is a graveyard of tottering walls and ashes. The smoke-clouded picture of the water front, reproduced above, was taken the morning after flames had swept the port and made it the homeless resort of 100,000 miserable persons of all nationalities. The fire occurred several weeks ago. Its origin reminds one of the great Chicago fire, caused by a cow kicking over a lamp. A high wind held Saloniki in its teeth and the water supply was scant. The Jews had closed their shops, for it was the day of Sabbath. An old woman in a decrepit wooden shanty was cooking a meager meal in a pot of boiling oil over an open fire. She made a clumsy movement and overturned the pot. Nothing could stop the roaring flames. Saloniki burned.

ARMY KITCHEN MAKES EXCELLENT SHOWING IN TEST

Great capacity and efficiency are the principal claims that are made for a new mobile field kitchen lately attached to the 102nd infantry for demonstration purposes. With two cooks it has shown itself capable of replacing two complete kitchen units of 80 men and 40 horses. At Yale field a few weeks ago it prepared a meal consisting of beef bouillon, boiled beef, beans, and coffee for 1,750 men, in less than one hour's time. The outfit has been developed by a hotel manager who visited Plattsburg two summers ago and determined to design an army kitchen that would obviate the wasteful and insanitary methods of food preparation that he found in use there. It is mounted on the chassis of a four-ton truck and consists of an upright 10-hp. boiler, a pair of 90-gal. stew, soup, or pot-roast kettles, and two 50-gal. coffee urns. The truck has a road speed of about 15 miles an hour.



Rear View of Mobile Field Kitchen Which in Less than an Hour has Prepared a Full Meal for 1,750 Hungry Soldiers



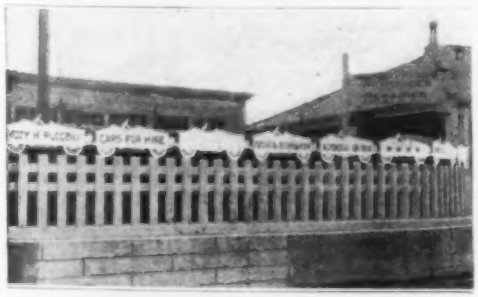
Two of the Units, It has been Demonstrated, Are Adequate to Meet the Needs of an Entire Regiment of Men

RADIO TELEPHONE USED FOR FOG WARNINGS

Fogs on the ocean, as is well known, often play strange tricks with warning sounds, leading sailors to destruction, and lighthouse lights are often obscured by the heavy mists, but greater reliability, it is hoped, will characterize a new type of signal which has been installed at Point Judith Light to warn mariners who in bad weather pass through, or near, Block Island Sound, at the east end of Long Island. The new signal is a radio telephone and any vessel equipped with an ordinary wireless receiver, when within a radius of several miles, can pick up the words, "Point Judith Light," that are repeated every five seconds. To every third call this warning, with a two-mile radius, is added: "You are getting closer. Keep off!" If the peculiar difficulties involved in operating signals of this type can be overcome, it is believed that eventually they will be installed all along the coast.

SIGN IN SEVEN LANGUAGES FOR JAPANESE GARAGE

Though the number of automobiles in Japan is not large, one enterprising garage owner in Yokohama is taking no chances on missing possible customers, foreign or native, because of their ignorance of languages not their own. In seven different languages he repeats the statement that he has cars for rent. This polyglot sign is printed on cut-outs resembling automobiles which line the top of a near-by fence.



Cars-for-Rent Sign of Yokohama, Japan, Garage Owner in Seven Languages

TYPEWRITER FEEDER SAVES OPERATOR'S TIME

To increase the output of a typist engaged in addressing envelopes and filling in form letters, an automatic feeder for typewriters has been developed. It conserves the effort and time usually spent in picking up paper, inserting it in a machine, and adjusting it to the proper position. The appliance is geared to the typewriter so that the feeding is accomplished with precision. Some 50 letterheads or envelopes are placed in a rack mounted above the machine at the back and are fed down one at a time as needed. The act of withdrawing a sheet of paper from the platen automatically pulls a fresh one into position. Because the attachment operates on its own track and is separate from the carriage, it does not retard a typewriter.

As a Finished Sheet is Withdrawn from the Machine, a Fresh One is Automatically Pulled around the Platen and into Position

NEW TEA WAGON EQUIPPED FOR ELECTRIC DISHES

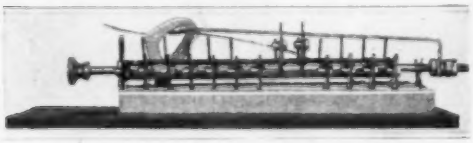
One of the newest types of tea wagons is designed especially for use in connection with electrically heated cooking utensils, being provided with a flexible 10-ft. cord which rolls up on a reel, concealed beneath the top of the

wagon. The reel operates like a window-shade roller so that the cord can be drawn out the desired distance and connected with a near-by socket without being under tension all the time. The cord is suitably joined with two shorter ones attached to the sides of the wagon and is provided with switch plugs to be inserted in the base of the dishes to be heated.

A Mahogany Tea Wagon Equipped with a Concealed Flexible-Cord Reel and Two Switch Plugs, Making the Use of Electrically Heated Utensils Especially Convenient

BULK POWDER IS DIVIDED INTO DOSES BY MACHINE

To facilitate the pharmacist in preparing prescriptions, a device has been contrived that divides a quantity of powder into the desired number of equal portions quicker and more accurately, it is claimed, than is usually done with a spatula. The mechanism employs a series of blades spaced equidistantly along a shaft and so arranged that when they drop into a trough, through which powder is evenly distributed, they separate the whole into several parts. When a lever controlling a spring is pressed, all the blades are moved forward one space. This causes a portion of powder to be delivered. By releasing the spring, the blades are raised and returned to their original position. The process, which is similar to the depression and release of a typewriter key, is then repeated. Regulation of the machine is easily accomplished so that an ordinary amount of powder can be divided into as many portions as is required.



The Instrument Is of Compact Size, and Proportions Powder for a Druggist More Quickly Than Does a Spatula

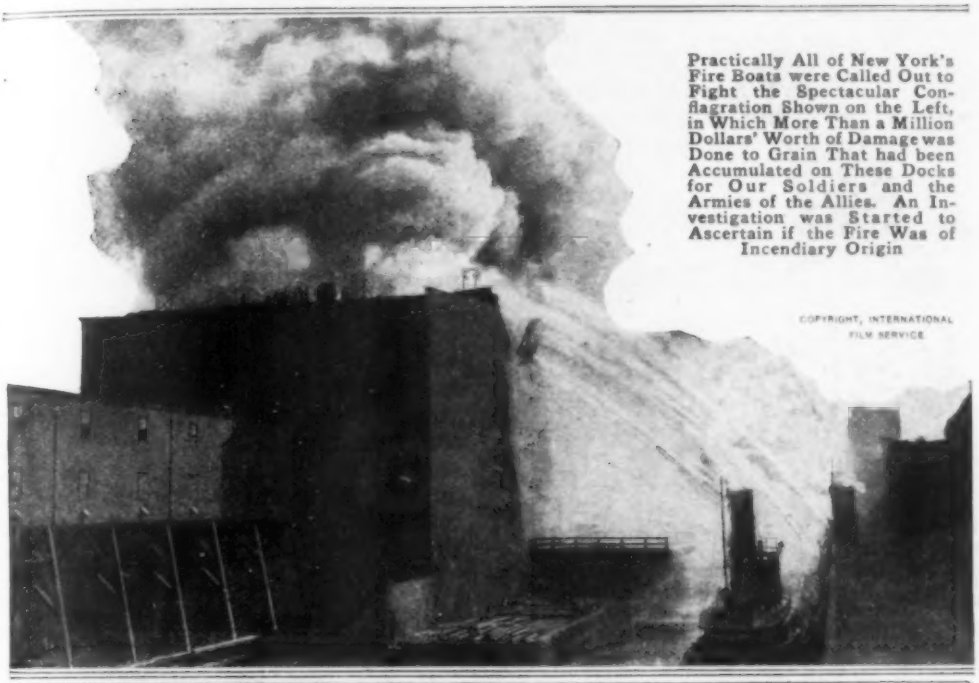
LEATHER GAS MASKS USED BY GERMAN FIGHTERS

Two interesting respirators of German origin, one of unusual character, were picked up not long ago by Canadian soldiers operating in the vicinity of Lens. Presumably because of the scarcity of rubber, the flexible parts of the mask attached to one of the devices had been made of light-weight leather. The other appliance merely consisted of a cylindrical box provided with a mouthpiece and nose clamp. According to incomplete information emanating from the official Canadian War Records office, this type of hoodless respirator is probably used by trench runners who apparently do not employ goggles. Except for this version, which because of its source must be fairly accurate, it would seem that the appliance had been torn from a mask like the first.

Above: New Type of Respirator Supposedly Used by Trench Runners. Right: German Mask Made of Leather Instead of Rubber Fabric

CANADIAN OFFICIAL PHOTOGRAPHS

LIVES LOST AND FOOD DESTROYED IN BIG FIRES



Practically All of New York's Fire Boats were Called Out to Fight the Spectacular Conflagration Shown on the Left, in Which More Than a Million Dollars' Worth of Damage was Done to Grain That had been Accumulated on These Docks for Our Soldiers and the Armies of the Allies. An Investigation was Started to Ascertain if the Fire Was of Incendiary Origin

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Removing the Body of One of the Firemen Killed in a San Francisco Lodging-House Fire: Three Minutes After the Fire Chief had Ordered His Men from the Burning Structure It Collapsed, the Falling Walls Killing Three and Injuring a Score of His Fighters Who were Standing Near

SIGN'S MOVING MANIKIN HELPS MONEY "DRIVE"

The effective means employed in stimulating public interest in a financial "drive" in Seattle recently consisted of a huge banner from which was suspended a Boy Scout manikin. The banner was stretched across a principal thoroughfare and was divided into sections representing $1,000 each. It also bore these words: "Help This Boy Scout Across the Street," and as the campaign progressed the figure was moved along to a position corresponding to the amounts pledged.

Sign in a Seattle Thoroughfare Showing the Movable Boy Scout Figure Used to Indicate the Progress of a Money-Raising Campaign

SCRAP LUMBER IS SAVED AT BIG ARMY CAMPS

Though immense piles of scrap lumber have accumulated at the various cantonments during the construction of the buildings to house the National Army, the waste of materials has not been as great as might appear at first. At Camp Funston, Fort Riley, Kan., for example, a crew of men with a buzz saw were set to work trimming the discarded pieces so that many of them were made available for building purposes. It sometimes happened that in the truck loads that were almost constantly being added to the piles, some perfectly good lumber was included by mistake. This was sorted out and returned to the carpenters. The pieces which were left after the scrap heaps at Camp Funston had been gone over, amounted to many tons and were set aside for firewood. At another camp two officers were arrested for not requiring their men to use scrap lumber instead of new lumber in making some shelving.

NEW FIRE-HOSE NOZZLE HAS NUMEROUS USES

In designing a new hose nozzle, the inventor, who is an experienced fireman, has sought to provide a single piece of equipment that is capable of producing any kind of a discharge desirable for fire fighting. It consists of an adjustable bell-shaped sleeve which incloses a member resembling a plain nozzle, except that it is provided with a special valve by which it can be opened or closed. Spray can be produced with or without a central straight stream by various adjustments of the sleeve. The misty discharge can be made either in the form of a beam several inches in diameter, which is less destructive than a plain

One of Two Immense Piles of Scrap Lumber Accumulated While Erecting Buildings at Camp Funston, Fort Riley, Kansas: At the Right can be Seen a Crew of Men with a Buzz Saw Engaged in Sorting and Trimming the Good Pieces

A Water Curtain is Shown Above, Accompanied by a Straight Stream. With This Protection a Fireman can Stand Close to Hot Flames

A Close View of the Nozzle Showing the Central Member with Its Separate Valve, and the Adjustable Bell-Like Sleeve with Which Spray is Produced

A Cone of Fine Spray: This Form of Discharge is Most Valuable in Driving Smoke from a Room or in Quickly Dampening a Large Area

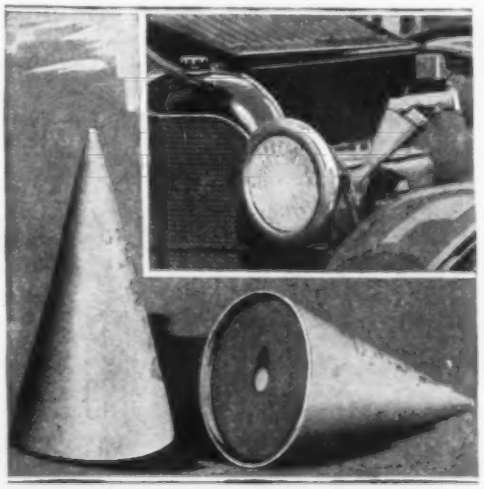
On the Left the Nozzle is being Used to Produce a Powerful Straight Stream. By an Adjustment Which Requires Only an Instant a Spray Such as is Shown on the Right can be Produced

stream, or in the form of a cone whose diameter can be varied at will without shutting off the water. A cone-shaped spray is often of great value in clearing a room of smoke or dampening a large area quickly without causing serious water damage. The nozzle can also be adjusted to produce a well-defined circular curtain of water which issues almost at right angles from the end piece and is a great protection when one is working close to the flames.

PAPER-CONE CONTAINERS FOR AUTO OIL

A cone-shaped container has been devised which is a special convenience for the motorist who desires to carry an extra supply of oil for his car. The cones are made water and oil proof and have a capacity of one quart each. A case holding four containers is provided, if desired. To empty a cone, a safety cap is removed, after which the apex is cut off with a pocketknife. Used receptacles may be made to serve as funnels by removing the bottoms.

The new containers will appeal especially to those traveling in sparsely settled regions where auto stations are far apart.



Light and Durable Quart Containers Made of Paper, for Automobile Oil: The Insert Shows a Cone Used as an Oilcan

GAS AND FLAME

Chemists and Mechanics Have Big Chance to Choke Kaiser in America's Spring Offensive

Several days remain in which expert mechanics, chemical workers, and those skilled in certain other lines can enter the Gas and Flame service regiment. Only red-blooded, well-built fellows who can take care of themselves can qualify.

Men who enlist now will be leaders in the spring offensive.

The pioneer Gas and Flame regiment, the 30th Engineers, will be ready to go "over there" by Thanksgiving Day. Those who enter it will be under the command of Col. A. A. Fries, now at the front. They will supervise the American offensive in Gas and Flame service and instruct men along the front in this important work. They will be in the thick of things where they will have to assume responsibilities and act upon their own initiative and individual judgment. There will be opportunities for commissions, especially as the service is expanded.

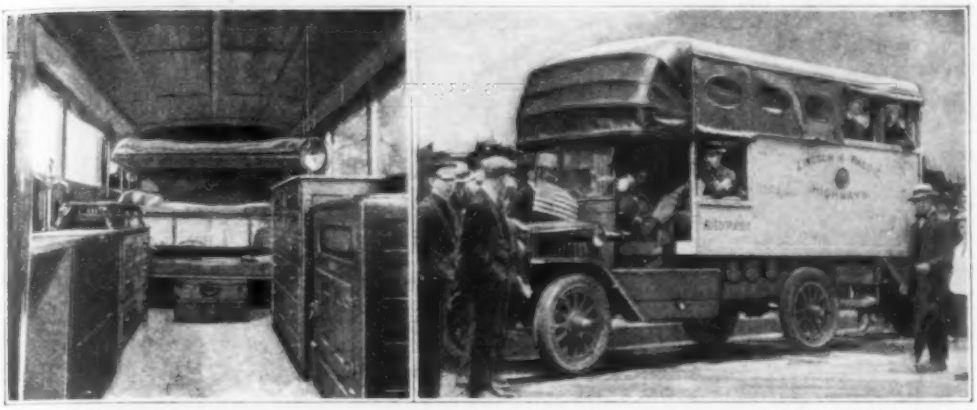
Here are the men who are wanted: Chemists, chemical workers, powder men, gas men, machinists, automobile repairmen, gas and steam engine experts, pipe fitters, electricians, designers, interpreters, carpenters, blacksmiths, plumbers, boiler makers, and chauffeurs. They must be of good muscular development and alive with energy. Men between 18 and 40 years of age are eligible.

To enlist, apply at the nearest recruiting station, state your qualifications and desire to join the 30th Engineers (Gas and Flame). All men must enlist as privates. Accepted men will be enlisted immediately and sent to the regiment's headquarters at Camp American University, D. C.

RAILWAY'S BIG COAL PILE REPRESENTS HEAVY LOSS

Foresight may prove more disastrous than beneficial at times if the fortune of a western railway company is conceded to be a criterion. In anticipation of the fuel shortage, a 28,000-ton coal pile was established on an open prairie in Iowa by the company. Some time later spontaneous combustion caused serious loss and made it necessary to remove some 3,000 tons of the coal as a fire-fighting measure.

Removing Coal from the Prairie Where It had been Stored in Anticipation of Shortage and High Prices



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Left: Interior View of the Car, Showing the Berths, Gas Stove, Refrigerator, Bureau, and Cupboard; Folding Dining Table and Chairs are Also Provided. Right: Automobile Truck Equipped Like a Pleasure Yacht Which Began a Transcontinental Journey a Few Weeks Ago

Prolonged exposure and heavy rains caused considerable deterioration. As a result it is estimated that the company has lost $50,000 in the venture.

FREE AND UNLIMITED POWER PROMISED BY INVENTOR

Soon, perhaps, a group of five scientists and the secretary of the interior will determine whether man's eternal riddle, the production of power without cost, has been solved. Just before its adjournment, Congress laid aside all other matters long enough to pass, at the request of the patents committee, a bill that will enable a little-known inventor to demonstrate to the first-mentioned body a machine that is supposed to utilize "free fuel." Utmost secrecy conceals all details of the apparatus, except its purpose. The fact that the patents committee witnessed a demonstration before taking its action has caused many potential critics to maintain discreet silence. The invention is not a perpetual-motion scheme, but there is no basis for conjecture as to its true nature. The claim is made that the device will permit aeroplanes to be heavily armored, carry enormous burdens, and fly until they fall apart, without having to descend for fuel. One congressman, who knows something of the mechanism has stated: "This invention will win the war."

CAR FITTED UP LIKE HOME FOR OVERLAND TRIP

All the conveniences of a seagoing pleasure yacht have been provided for in a one-ton truck which started on a journey from Boston to Seattle a few weeks ago. Immediately back of the driver's seat is a steel framework supporting three spring beds, one above the other. To the rear of the beds the body of the car takes on the aspect of a kitchen and dining room combined. On one side is a gas stove, a set of drawers, a sink, and a cupboard. On the opposite side is a bureau with eight drawers, and an ice box with a capacity for 50 lb. of ice. Beneath the body are three gas tanks which supply fuel to the gas stove and to a jet which lights the room brilliantly. Two other tanks are situated beneath the car, one with a capacity for 45 gal. of gasoline, and the other a 60-gal. container for water which can be drawn upon at any time by means of a pump located beside the sink. Pneumatic tires make the truck very easy-riding.

¶The Dutch authorities are reported to have recently tested and found practical a device for steamships invented by one of their naval officers, which cuts anchor chains of floating mines and prevents the latter from coming in contact with a vessel passing through a mine field.

MACHINE GUNS RATTLE IN NEVSKY PROSPECT

A REMARKABLE memento of the revolutionary outbreak that occurred at Petrograd last July: A picture that vividly portrays the terror that reigned in Nevsky Prospect when the ultra radicals and anarchists trained machine guns on people in the streets. Rifles were mounted on the top of the library building visible in the background. The dead are shown scattered along the pavement and wounded victims are to be seen here and there crawling on their hands and knees to cover. Action tells the rest of the story.

FLYING HUNS BOMB HOSPITALS IN FRANCE

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To Those Who Find Excuses for the Invasion of Belgium and the "Lusitania's" Destruction, This Picture of the Holocaust at Vadelaincourt is Submitted. It Shows the Twisted Metal Beds That Held Wounded Soldiers in the Hospital for Three Hours the Target of German Incendiary Bombs

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During the Raid on the Hospital One of the Enemy's Planes was Felled. The Observer Escaped with Slight Wounds and is Shown on the Way to a Hospital That, Fortunately for Him, He Failed to Destroy

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End of a Kultur Vulture: The Wrecked Plane and Its Dead Pilot after the Bombing of Vadelaincourt's Hospital. Of Late Months the Teutons have Conducted a Systematic Campaign against Hospitals, Attacking, among Others, Those at Belrupt, Monthairon, and Dugny, and Two American Bases

SPIRITLESS RUSSIAN TROOPS ARE SHAMED

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The Accompanying Photographs Show the Demoralization of Russian Troops in Different Sectors. Above, Officers with Drawn Revolvers have Stopped a Truck Loaded with Fleeing Soldiers and Forced Them to Leave the Car. In the Foreground Is a Russian Captain Who is Attached to the British Armored Cars as Interpreter

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Here One Russian Fellow with Spunk is Using the Butt of His Rifle to Stop a Pair of Retreating Soldiers. Such Scenes have been Tragically Common in Many Sectors along the Eastern Front

British Soldiers in the Russian Trenches Endeavoring to Stem the Tide of Defeat: Members of the Armored Motor-Car Corps Fought Valiantly to Meet the Grave Crisis

A Truly Remarkable War Document: Russians in Complete Rout. Upon Hearing a Rumor That the German Cavalry had Broken through the Lines, Panic Seized the Men and They Ran Like Terrified Children, Many of Them Abandoning Their Rifles

BY HEROIC GIRLS AND BRITISH TOMMIES

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Assisted by Men Who Remained Loyal to the Cause, English Officers Attached to the Russian Army are Shown Stopping Retreating Slavs and Forcing Them to Turn and Face the On-Coming Germans

DRAWN BY F. MATANIA FOR THE SPHERE, LONDON. COPYRIGHTED IN THE UNITED STATES BY THE NEW YORK HERALD CO.

Although Betrayed by Her Men in the Hour of Need, Russia has Received Marvelous Support from Her Women, Whose Patriotism and Bravery are Destined to Fill a Glorious Page in the History of the Twentieth Century. Above Is a Picture That Tells an Inspiring Story without the Assistance of Words and Stock Phrases. It might Fittingly be Entitled "Womanhood"

WITH OUR BOYS IN THEIR TRAINING

It Took a Circus Rider to Master the Nervous Little Broncho That is Entertaining the Crowd at the Side. It was Received by a Massachusetts National Guard Unit and before the Circus Came to Town Succeeded in Sending Four Young Fellows to the Hospital

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Thanks to a Group of Admiring Young Women, the Second Battery, Sixth Field Artillery, Stationed at Fort Myer, Now Has a Chummy Brown Cub, "Miss Liberty," as Its Mascot and Overseas Chaperon

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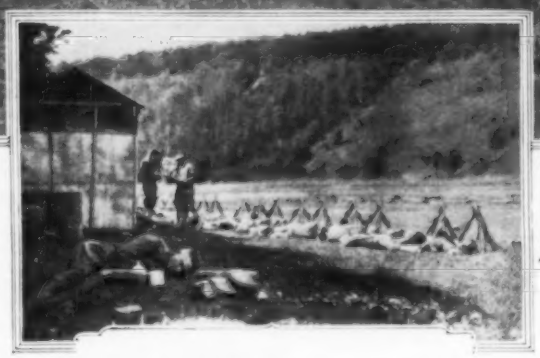
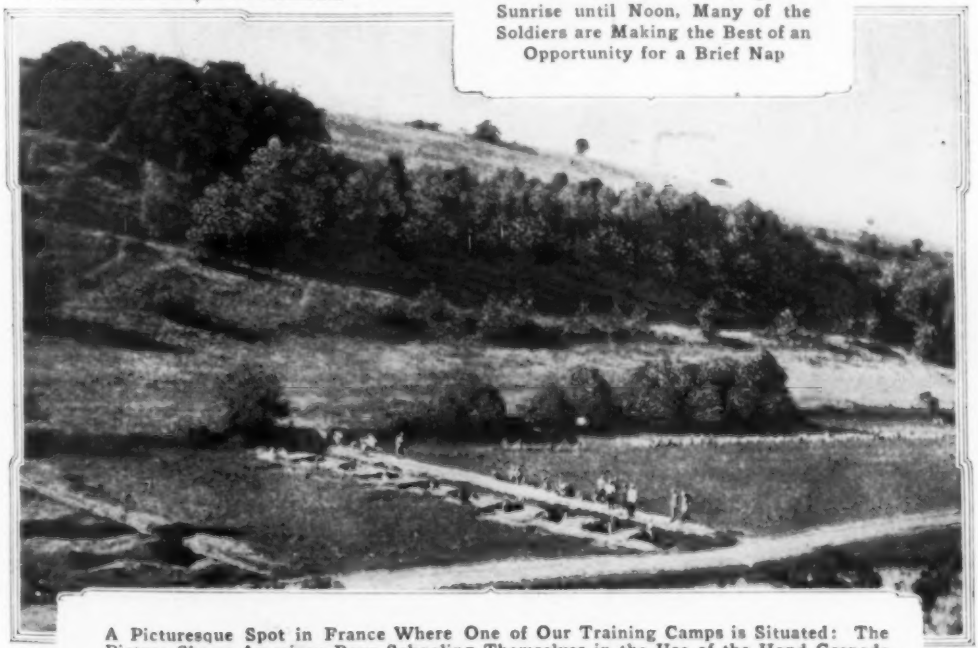
Open-Air School at Governor's Island Where Soldiers are being Taught the Language of Poilu: Intensive Instruction is Given in Conversational French. Apparently Male Tourists after the War will Encounter Embarrassing Questions in Paris if Unfamiliar with "Soldiers' French"

CAMPS HERE AND ACROSS THE WATER

In the Photograph Above, Passed by the Signal Corps Censor, a Group of Veteran Chasseurs Alpines are Shown Instructing a Number of American Soldiers in the Approved Etiquette of the Bayonet, a Weapon They Use Most Proficiently



After a Hard Workout, Lasting from Sunrise until Noon, Many of the Soldiers are Making the Best of an Opportunity for a Brief Nap



A Picturesque Spot in France Where One of Our Training Camps is Situated: The Picture Shows American Boys Schooling Themselves in the Use of the Hand Grenade While Taking "Enemy" Trenches under the Tutelage of Experienced Fighters. The Photograph has been Passed by the Censor

IN THE WAR THEATER WITH THE GALLANT

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Under the Best of Conditions the Lot of the Wounded Soldier Is a Hard One, but in the Mountain Regions Where the Italians are Fighting It Is Often Pitiful, Owing to the Difficult Problem of Transportation. Here, Wounded Fellows Who have Marched a Long Distance to Reach the Road are Patiently Awaiting the Arrival of Ambulances

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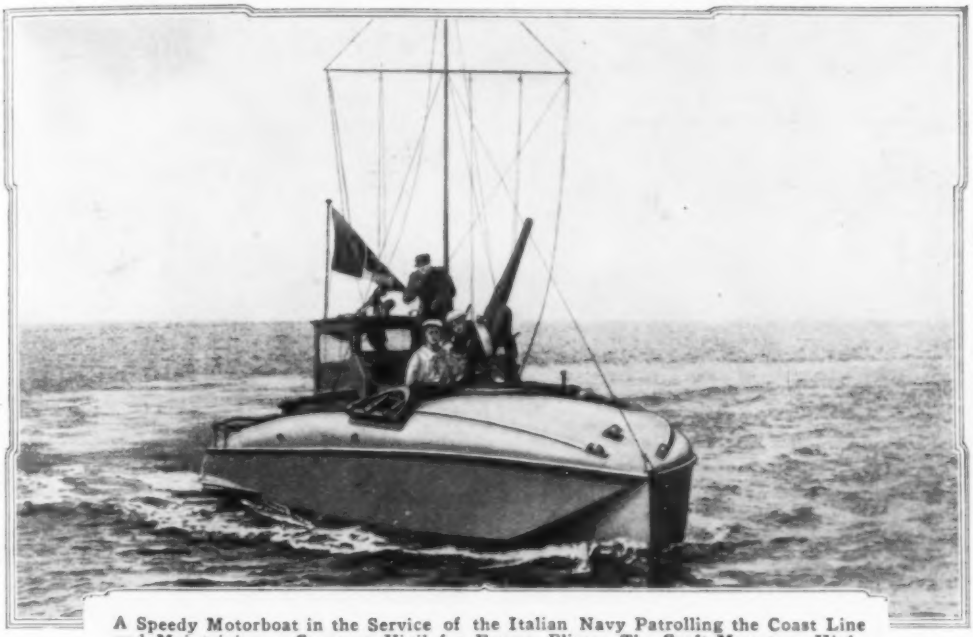
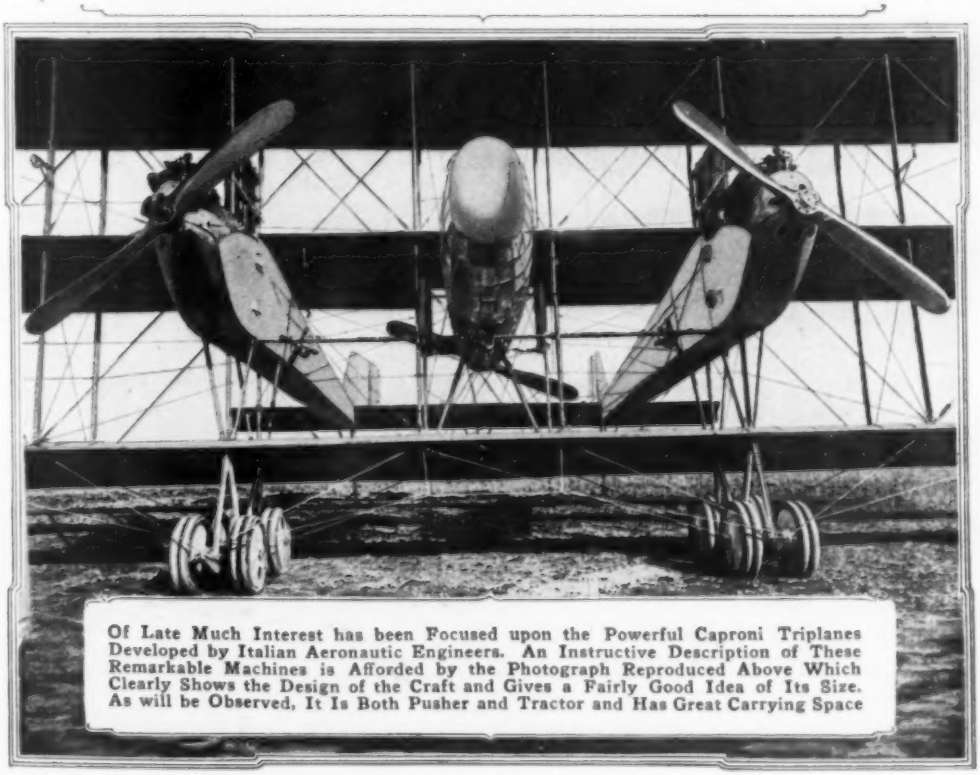
The Water Cart Drawn by Sturdy Dogs Is a Familiar Sight at the Italian Front. In Many Places the Troops Are Entirely Dependent upon These Faithful Fellows for Their Water Supply

At the Hands of the Austrians Some Italian Cities have Fared Little Better than Many of Those In Northern France and Belgium. In This Picture a Detachment of King Emmanuel's Troops is Bivouacked in the Midst of Buildings Apparently Wrecked by Aerial Bombs

ITALIAN LAND, AERIAL, AND NAVAL FORCES



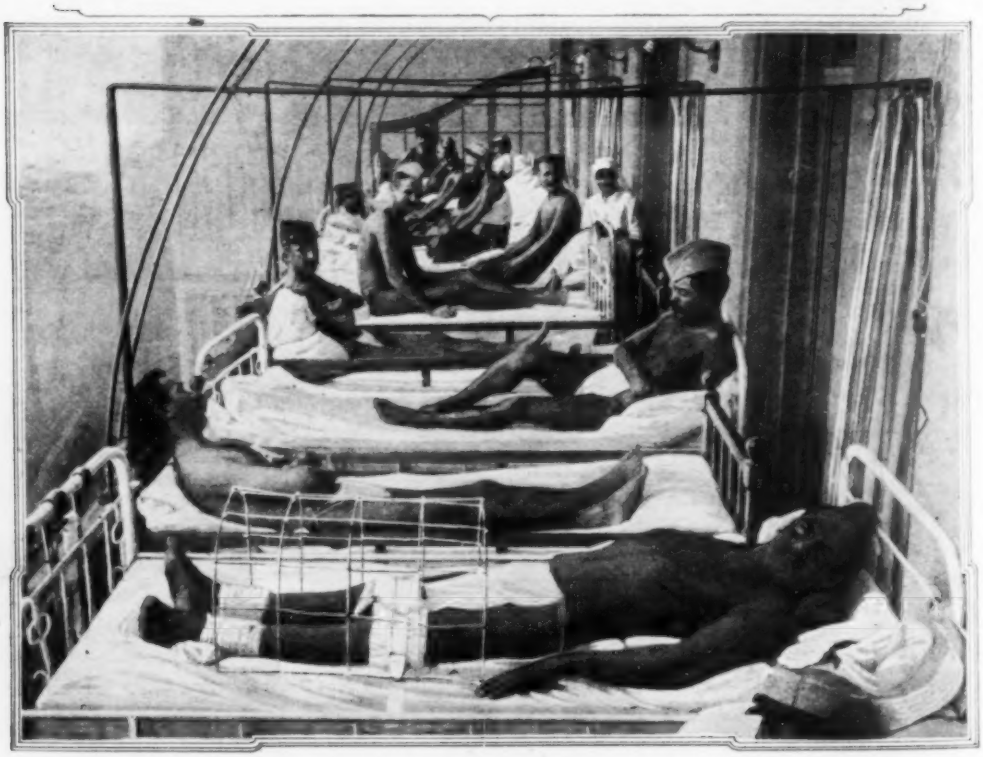
A Speedy Motorboat in the Service of the Italian Navy Patrolling the Coast Line and Maintaining a Constant Vigil for Enemy Fliers: The Craft Mounts a High-Angle Quick-Fire Gun at the Forward End of the Cockpit and Also Supports a Radio Mast. Such Vessels as This One have Proved Valuable throughout the War, and Many of Similar Character are Now Guarding Our Own Waters



Of Late Much Interest has been Focused upon the Powerful Caproni Triplanes Developed by Italian Aeronautic Engineers. An Instructive Description of These Remarkable Machines is Afforded by the Photograph Reproduced Above Which Clearly Shows the Design of the Craft and Gives a Fairly Good Idea of Its Size. As will be Observed, It Is Both Pusher and Tractor and Has Great Carrying Space

TUBERCULAR PRISONERS GIVEN SUN TREATMENT

MANY cases of tuberculosis have been found among invalided prisoners of war held in Switzerland. Such men are being sent to the widely famed sanitarium at Leysin for treatment. There, near the Rhone River a few miles above Lake Geneva, the fellows are divested of clothing and exposed to the sun's rays for hours each day. Those who are weak, or prevented from moving because of wounds, occupy cots on roofless balconies. For others, various forms of labor are provided in the open so that they may utilize their energies and fill their minds enjoyably. The photograph above shows a number of the men at work, and that below gives a glimpse of one of the cot-lined balconies.



WHERE THE "SPIRIT OF FRANCE" IS UNDYING

FRENCH OFFICIAL PHOTOGRAPH

"A Soldier of France to His Mother," Perhaps, or Possibly a Poilu Posing for the Convenience of a French Official Photographer: Anyway We Get an Intimate Glimpse of Life in a Trench Dugout Where Comforts Are Few and Brave Hearts Many. At the Left will be Noticed a Well-Filled Rifle Rack

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Here Is Camouflage with a Vengeance: The Picture is Said to Show a French Communication Trench Covered with Canvas and Verdure to Conceal It from Airmen. To Us It Looks Like the Interior of an Improvised Greenhouse

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This Is Not a Pleasure Resort or a Sanitarium in the Strict Sense, but Nevertheless It Is Both. It Is a Camp near the Marne in Which Soldiers after a Trying Turn in the First-Line Trenches are Given Opportunity to Rest for Two or Three Days, Recover Lost Sleep, and Get Glimpses of Something besides Earthen Walls, Sandbags, and Shell Pits. The Narrow-Gauge Railway Carries Supplies to the Front

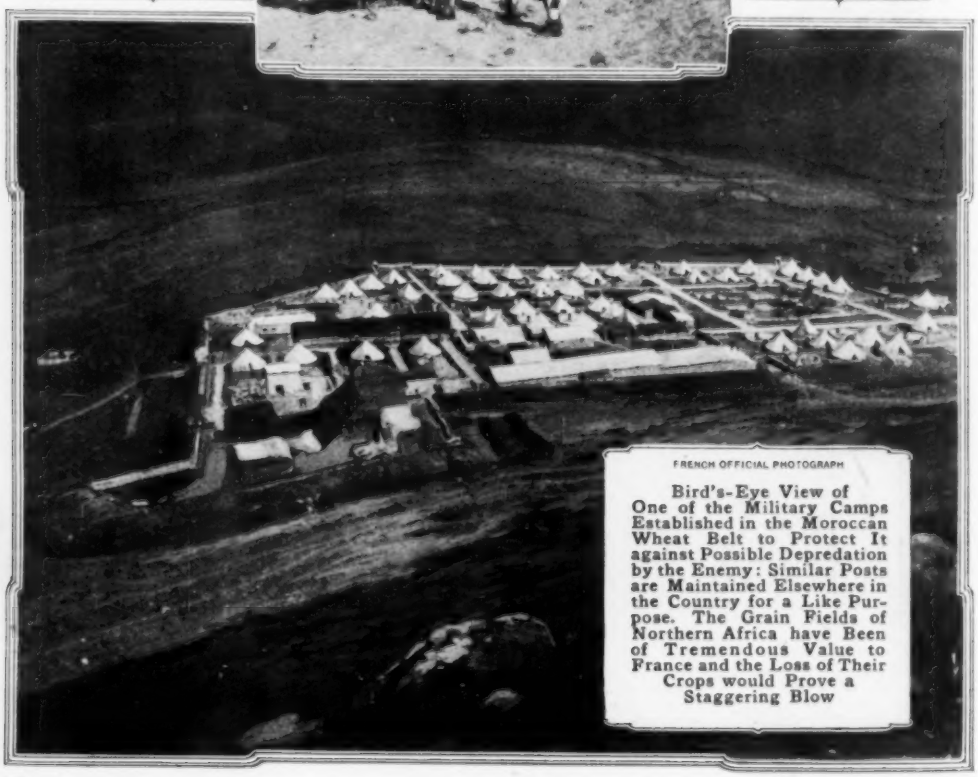
FRENCH OFFICIAL PHOTOGRAPH

ODD AND STRIKING PHASES OF GREAT WAR

FRENCH OFFICIAL PHOTOGRAPH

Bearing an Extremely Unwieldy Burden: A Camel Belonging to the British Army's Supply Train in Palestine

Wheat Destined for France being Weighed at One of the Receiving Depots Established by the Colonial Office in Morocco: The Work is Done under the Supervision of French Army Officers



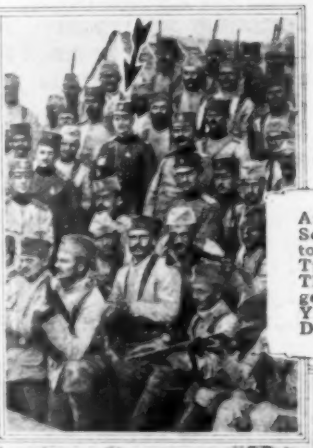
FRENCH OFFICIAL PHOTOGRAPH

Bird's-Eye View of One of the Military Camps Established in the Moroccan Wheat Belt to Protect It against Possible Depredation by the Enemy: Similar Posts are Maintained Elsewhere in the Country for a Like Purpose. The Grain Fields of Northern Africa have Been of Tremendous Value to France and the Loss of Their Crops would Prove a Staggering Blow

SHOWN IN PHOTOGRAPHS TAKEN AT RANDOM

Englishwomen at the Front: Showing Two Ambulance Drivers in Service Uniforms at a Shell-Wrecked Church in France; Their Steel Helmets Indicate That They Are in the Firing Zone

The Two Canadian Soldiers are Leaning against One of the Spike-Studded Platforms Used by the Germans during Their "Victorious Retreat" Last Spring to Hamper Pursuit. They were Placed in Trenches and along Important Roads



At the Left Are American Serbs and Croats, Attached to the Serbian Army, at a Training Camp in Tunis: The Arrow Points to Sergeant Flora Sanders, a Young Englishwoman Decorated by King Peter

Preparing Nets with Which to Ensnarl German Submarines: The Picture was Taken Aboard a British Boat and Shows Seamen Engaged in Covering Buoys, Used for Supporting the Big War Seines in the Water, with Wire Netting

DECORATED ENGINE HERALDS PILOT'S PATRIOTISM

What might be termed a patriotic locomotive, a big engine with the stars and stripes liberally emblazoned on it,

Philadelphia-Washington Locomotive Dressed Up with American Flags to Demonstrate the War Views of Its Crew

has been operated between Philadelphia and Washington since our entrance into the world war. At the outset of hostilities, the locomotive was put in one of the company's shops and decorated by an employe of German birth. Old Glory was painted on the front and side of each of the steam chests and large five-pointed stars placed on the cylinder heads.

METHODS OF MANIFOLDING BOOKS FOR THE BLIND

A method of manifolding books with raised letters for the blind, which has recently been brought into use in Europe, possesses special interest because of its simplicity. In this process a sheet of paper is placed between two frames having openings corresponding to the letters to be punched. An oiled, waterproof paper is stretched underneath and the letters are punched with an instrument having some resemblance to a ticket punch. When the perforating has been completed a sort of pulp containing dextrin, starch, and rubber is spread over the frame. This dries in a short time and, when removed, reveals the letters in relief on one face. With this matrix, printing can be done at home if desired.

NEW PORTABLE MACHINE FOR EXTRACTING GOLD

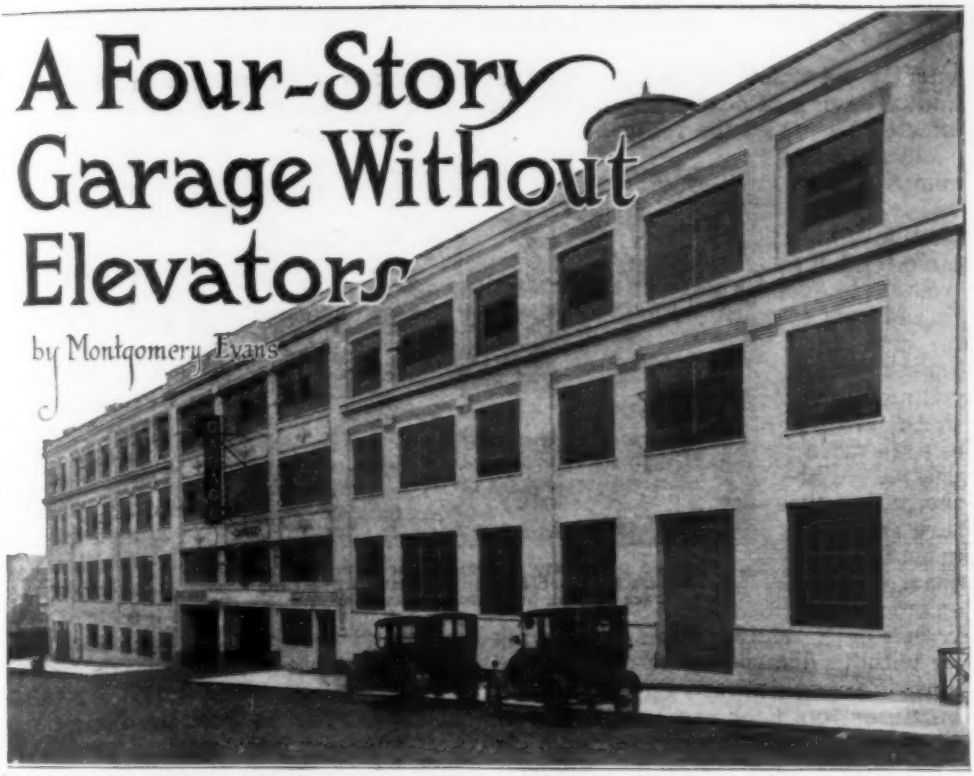
There has recently been put into operation a machine for extracting gold from gold-bearing sand which, it is claimed, allows only a very small fraction of the precious metal to escape. It measures 4½ ft. long, 5 ft. high, and 30 in. wide, and is so constructed that it can be taken apart or put together in a few minutes. With it old beds, as well as new ones, can often be worked with profit. The sluice box consists of two upright end members containing traps, connected by two inclosed sets of riffles, one above the other and slanting in opposite directions. The sides of the machine are of glass so that its working parts can be viewed at all times. No power is required to operate the apparatus, the gold-bearing sand, which has previously been separated from the coarser materials by a screening process, being carried

The New Sluice Box Showing the Glass Sides behind Which Are the Traps and Riffles Retaining the Metal

through the various traps and over the riffles by the force of the water. The machine's capacity is claimed to be 200 tons per day.

A Four-Story Garage Without Elevators

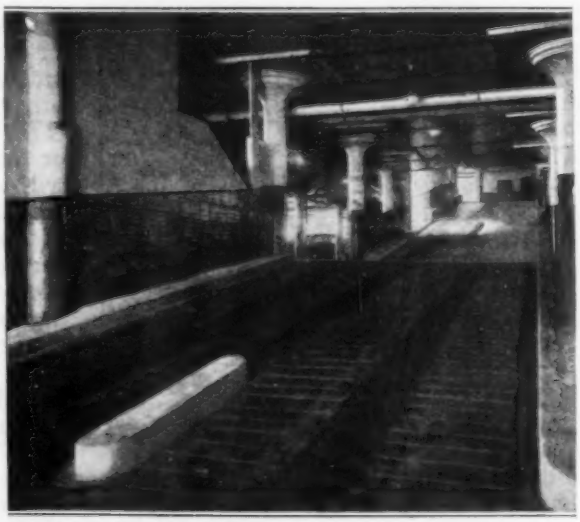
by Montgomery Evans



Exterior View of One of the Most Modernly Equipped Garages in the Country: It Has a Capacity for 600 Cars on Its Four Floors and is Provided with Two-Way Inclines Instead of Elevators—an Arrangement That Is Very Convenient for the Patrons and Economical for the Proprietors

A GARAGE which in point of novel features, equipment, and general service outclasses any other in the country, has been recently completed in New York City. Six hundred cars can be accommodated in 164,000 sq. ft. of the total floor area of 205,000 square feet.

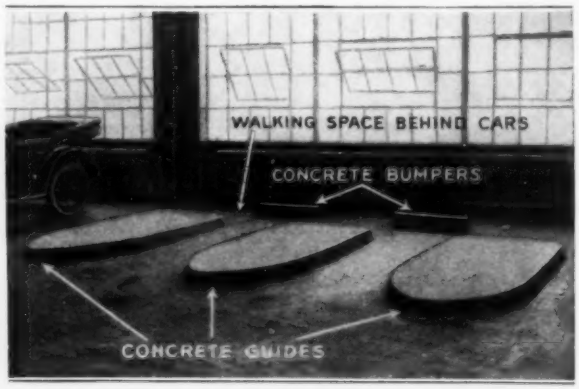
Although the garage is four stories high, two-way inclined concrete ramps take the place of elevators and effect a saving of about $18,250 in annual overhead expense. The ramps extend from floor to floor of the structure and take up the same amount of space as elevators, but the cost of constructing them is the only expense connected with them, for it costs nothing to operate them. The architect of the building has figured that the minimum cost of each trip of an elevator is 10 cents and that it would require at least 250 trips each day to serve the 600 cars accommodated. Conse-



Looking up the Wide Ramps to the Third Floor from the Entrance: These Inclines can Easily Accommodate Two Lines of Cars

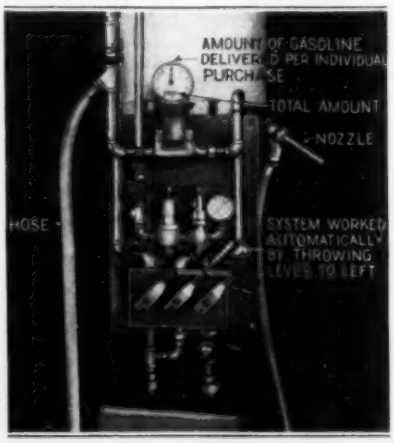
quently he calculates that an initial annual saving of nearly $19,000 will be effected by use of the ramps.

Because the ramps are 18 ft. wide, and therefore wide enough to permit one line of cars to go up while another line is coming down, there are no exasperating delays. Furthermore, the cars are automatically spaced apart on the floors so that each chauffeur can operate his car without disturbing the cars next to him. Cars which are spaced on the fourth, or top, floor can be brought to the street in from 10 to 15 seconds. It is impossible for machines to collide on the ramps, for concrete guides, or curbs, in the middle of each ramp restrict the cars to separate paths.



A View of the Safety Platforms That Prevent Careless Drivers from Colliding with Other Cars: At the Back of Each Stall Are Concrete Bumpers

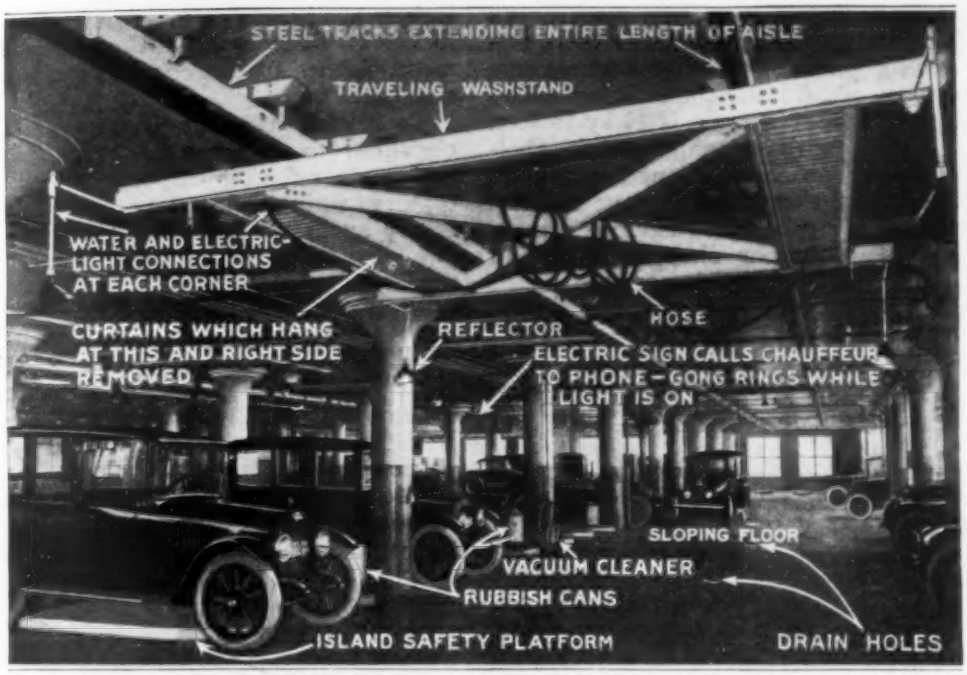
The ground floor of the garage is devoted entirely to the storage of cars and is reached by a short ramp, as the entrance is slightly below the street level. The second floor is reached by a short ramp which continues straight up to the third floor, where it turns to the left and continues along the back of the building to the fourth floor. The grade of the inclines is 15 per cent, which is not too steep for the average car to climb on second gear, nor so steep that the average car would have difficulty in descending with poor brakes.



Gasoline is Delivered to Each Floor by Means of Apparatus of This Character, Which Includes a Gauge Showing the Amount of Fuel Supplied to the User

One of the biggest improvements that has ever been made in garage construction consists of concrete guards and bumpers in the car stalls. Most up-to-date garages assign the positions of cars by means of whitewash lines, but this in no way eliminates the element of danger of backing into an adjoining car. In the garage described, whitewash lines are done away with and in their place are substituted concrete boat-shaped islands, 10 ft. long and 49 in. wide, which are raised about five inches from the floor.

No matter how careless the driver may be, he cannot bump into adjacent cars when driving in or out. As each car enters its stall from the aisle it is backed up until its rear wheels strike the curved end of the island. This guides the car automatically into its correct position, allowing a leeway of from three to four inches one side or other of the car. Thus each car can run into or out of its stall without disturbing its neighbors. The worry of damaging other cars or one's own by the dangerous backing operation is thus entirely eliminated. Near the rear of each island is a concrete bumper, 2 ft. long, 6 in. wide, and 6 in. high, which serves as a stop for the rear wheels of the car. The width of the car space is 7½ ft. and the minimum distance between running boards



General View of One of the Floors Showing the Movable Wash Rack Suspended from Overhead Tracks: The Rack is Placed above a Car That is to be Washed and Curtains are Drawn Down from It to Inclose the Automobile so That Near-By Cars will Not be Splashed

is 14 in. All the aisles are 18 ft. in width.

In most other garages, when cars are to be washed, they have to be moved out of their stalls and taken to the washer. In the model garage described a traveling, overhead wash rack is brought to each car. In other words, each car is washed in the aisle directly in front of its confined space. The washing of each car is done as follows: The car is pushed straight out into the aisle, the washer is rolled over, canvas curtains hung from the frames on the sides are pulled down like ordinary window shades to prevent splashing adjoining cars, and the aisle sides are left open for light and air. The hose is suspended from two corners of the wash rack, and there is a light at each corner to illuminate the car, as well as air and vacuum connections. Each square in which the washing is done is provided with a drain and the floor slopes gently toward it. The wash rack itself is merely a wooden frame to carry the hose, lights, and curtains.

For cleaning the interior of cars and polishing them, women are employed. They are said to be more conscientious, more reliable and faster workers than men employed for the same kind of work. They are paid $2 a day, which is the same salary paid to male cleaners and polishers.

Another noteworthy feature of this new garage is a pressure system for distributing gasoline to various points on all the floors. This eliminates delay and makes for better service in every way. There is also a vacuum system for cleaning the interior of cars. Pipe connections are located on posts and the dirt is drawn to a pump in the basement of the building. Thus dirt is eliminated instead of being scattered over adjacent cars, as is the case in the majority of garages available for automobile owners at the present time.

There are few garages where satisfactory facilities are afforded chauffeurs for doing minor repairs on their cars. In most cases the cramped quarters and the ever-moving stream of

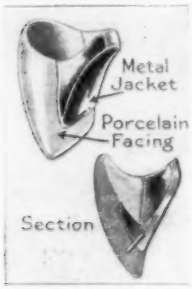
cars prevent a man from working on his car. In this new garage there is a workshop on the third floor where cars may be repaired by their owners or by chauffeurs. The room is 42 by 75 feet.

Although the tipping evil is abolished and no commissions are paid to chauffeurs, everything is done to compensate for this lack. There is a reading room, barber shop, billiard and pool room, and lunch counter, all in one unit on the top floor. Big, roomy lockers are furnished to patrons. Each locker is fitted with a tire compartment, clothes space, robe rail, tool box, and letter box.

To enable the car owner or his chauffeur to examine the soaps, oils, and greases for his car, a testing laboratory, fully equipped with the necessary apparatus, is maintained by the garage. Charges for runabouts and touring cars are $35, and for inclosed cars, $40 a month.

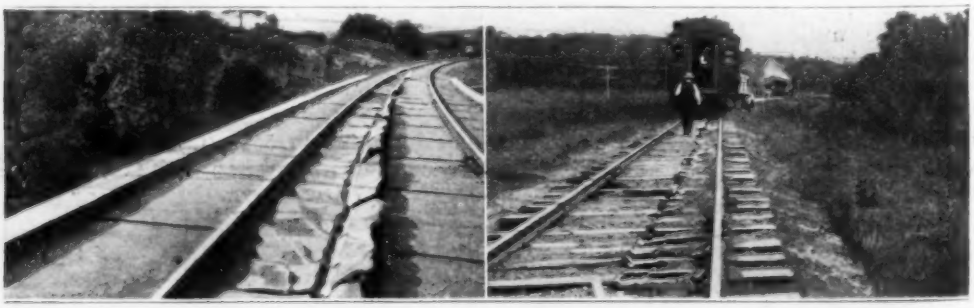
NEW PORCELAIN FACING FOR CROWNED TEETH

A porcelain-jacket crown for a tooth is commonly preferred to a gold crown, particularly if the artificial member is conspicuously located, but the former is costly and difficult to mount. As a substitute for the common type of porcelain-jacket crown a dentist has invented a porcelain facing that can be easily fitted to a metal jacket set on the natural tooth. Each of these new facings is provided with four depressions on its inner surface and protruding near the cutting end is a T-shaped anchor. After a facing of the desired color and shape has been selected it is held next to the tooth to be crowned while a wax jacket is fashioned around the latter, the wax filling the depressions in the facing and inclosing the anchor. Then the facing and wax jacket are removed and placed in a plaster mold, after which the wax is melted and metal poured in its place. In this comparatively simple manner a perfect-fitting jacket, with a well-matched facing, is produced.

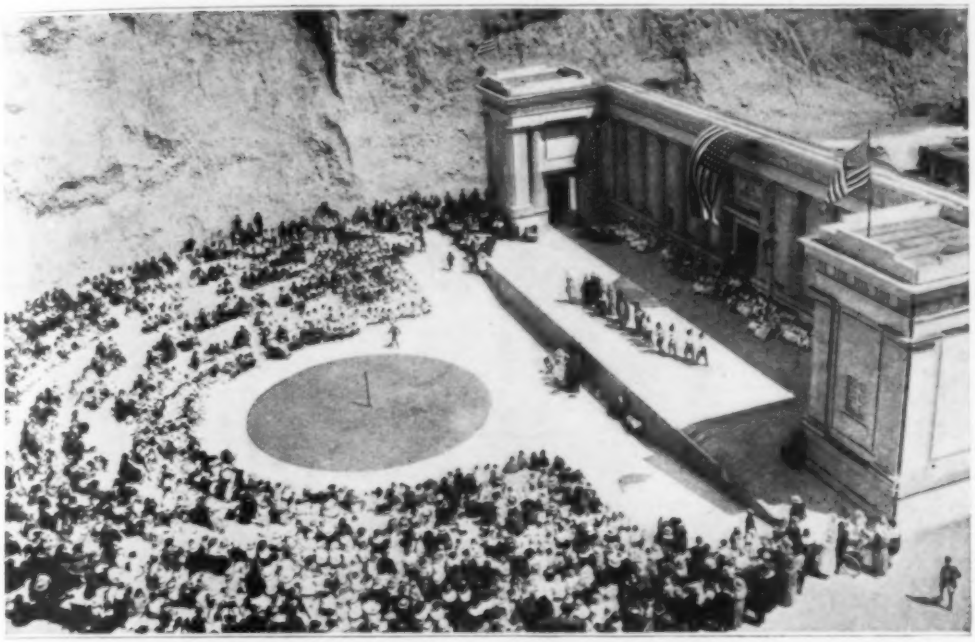


SERIOUS RAILROAD WRECK NARROWLY AVERTED

While a passenger train on a transcontinental line in Minnesota was endeavoring to make up for lost time, the front truck of the engine tender jumped the tracks and ran along the ties for about 1,500 feet. What probably would have been a far more serious accident was averted by the fact that the engine and tender finally broke loose from the cars and the latter came to a stop while still on the track. Had they been drawn much farther they might have been derailed and plunged into a ravine close by.



Left: Railroad Bridge Showing Rut in the Sheet-Iron Covering Made by a Derailed Tender Truck. Right: This Photograph Shows the Point at Which the Cars Came to a Stop After the Engine and Tender Broke Away from Them; had This Not Happened the Whole Train Might have been Plunged into a Ravine



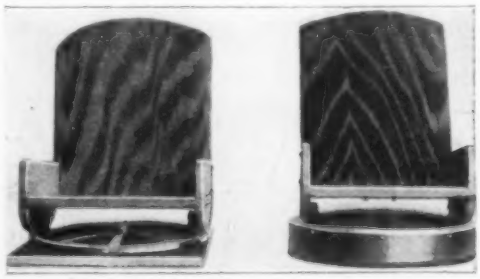
Once an Unsightly Gravel Pit—Now a Municipal Outdoor Theater That Is a Benefit and Pleasure to the Entire Community

CITY EYESORE TRANSFORMED INTO GREEK THEATER

It has remained for a progressive little city in the West to find a real use for an abandoned gravel pit and convert it into an attractive institution of benefit to the whole community. It was discovered that a large excavation in one side of a hill situated in a public park at Pomona, Cal., had excellent acoustic properties, and a movement was subsequently launched to employ it as the site for an open-air theater of classic design. The scheme was carried out at a cost of about $20,000 and all of the amount was raised by subscription. Reinforced concrete was used in the construction of an imposing stage 140 ft. in width and 40 ft. deep. In front of it is an arena, rising above which are crescent-shaped tiers of seats that accommodate, at present, 2,500 persons. Provision is to be made soon for additional seats so that approximately 15,000 individuals can attend the outdoor entertainments that are given at fairly frequent intervals during pleasant weather.

REVOLVING ROCKING CHAIR FOR CAR OR HOME

A rocking chair which revolves on a circular base has been invented for use either in railway chair cars or the home. The rockers are fastened by coil springs to the upper half of a turntable which resembles a fifth wheel. The lower half is bolted to the floor of the car or to a movable base, according to the place in which it is used. If desired, ball bearings can be employed, permitting the chair to revolve more easily.



Two Designs of a New Revolving Rocking Chair: The One on the Left Is for a Chair Car and the Other for Home Use

CONVENIENT CORNER FOUND IN WELL-PLANNED KITCHEN

One housekeeper who makes her white-enameled kitchen an inviting culinary laboratory instead of a hot, stuffy workshop, has planned a sunny corner of the room most attractively. Between two windows, and placed several feet above the floor, is a built-in bookcase in which a small library of cookbooks, menu calendars, and useful magazines is kept behind glass doors ready for reference. Beneath is a closet in which sewing is kept. The top of this compartment forms a convenient shelf for bread jars, a toaster, and other things. A comfortable rocking-chair stands adjacent. The corner not only offers a pleasant place to rest occasionally, but also saves time and steps. The next day's meals may be planned, or a bit of sewing done, during odd moments that might otherwise be wasted. In this manner the maximum is accomplished with a minimum of effort.

An Arrangement That Saves Steps and Time in Doing Housework

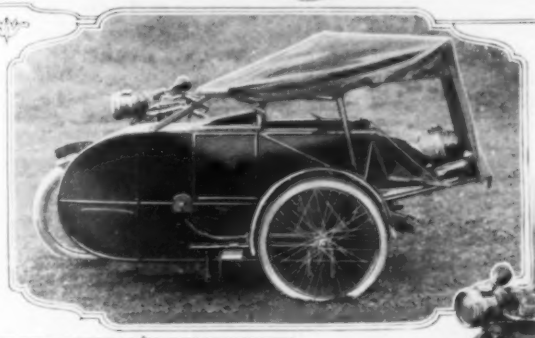
¶The German state railways are in serious straits, according to press dispatches, because of a fuel shortage and to curtail traffic heavy excess fares on express passenger trains are being levied.

SIDECAR DE LUXE EQUIPPED FOR CAMP OR WAR USE

A sidecar de luxe for motorcycles, which serves equally well as the usual carrier for two passengers, as an ambulance, or as a very complete camping outfit, has been designed by an English inventor. It consists of an attractive metal body divided into three compartments. In one there is room for two passengers. Another, at the front end, consists of two lockers, and the third occupies the lower portion of the car and is equipped with a special removable case, or portmanteau. This container is composed of two halves hinged together in such a way that they can be opened out to form a table suitable for emergency use by a surgeon. One portion contains drawers in which supplies may be stored, and blankets or clothing may be kept in the other half. A small folding table, together with the two camp chairs that are provided to support the case, are carried strapped to the rear of the body.

The sidecar is provided with a folding top, while the rear of the car is so made that it can be let down to permit the loading or unloading of a patient. A stretcher, with wheel supports, which folds up and is carried inside the body, is a part of the outfit and on camping trips serves as one of three beds, the other two being the portmanteau and the sidecar itself, which has removable upholstery that is covered with leather on one side and with cloth on the other. This serves very satisfactorily as a mattress. Another important article provided with the car is a thoroughly waterproof tent with a frame composed of telescoping parts. It measures 14 by 10 ft. and is divided by a curtain into two rooms.

An Elaborately Equipped Sidecar That is Well Suited for Ambulance Service, as Shown Above and at the Left: In the Latter View a Patient can be Seen Lying Full Length in the Car. The Stretcher, Which Is of the Folding Type with Wheel Supports, Is a Part of the Outfit



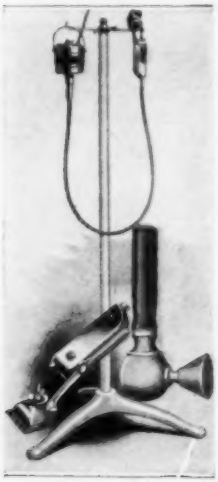
Though Only One Passenger is Shown in the Sidecar as Pictured at the Right, It Has Ample Accommodations for Two. The Fact That a Baby can be Carried Comfortably in the Bottom of the Compartment near the Front End, Makes the Outfit Particularly Desirable for Family Outings

At the Left, the Portmanteau has been Set Up to Serve as an Operating Table. The Drawers may be Used by a Surgeon to Hold His Instruments, or by Campers for Storing Supplies. The Camp-Chair Supports and the Camp Table are Carried Strapped to the Rear of the Car

Thoroughly Waterproofed Material is Used in Making This Tent, Which is Carried as a Part of the Outfit. It Measures 10 by 14 Feet and the Frame is Composed of Telescoping Parts That can be Packed into Small Space. A Curtain Divides the Tent into Two Rooms. At the Right the Portmanteau is Shown Standing on Edge. The Capacity of the Car Is Sufficient to Carry All the Utensils and Bedding Necessary for Camping Out

POWER-DRIVEN CLIPPER NEW BARBER-SHOP ACCESSORY

Hair cutting by electricity is a barber-shop innovation that has lately made its appearance. The equipment employed consists of a power-driven clipper that is intended to displace the time-honored shears. Better and quicker work is claimed to be the advantage gained by installation of the apparatus, which has already been adopted by a number of high-grade tonsorial emporiums in large cities. An enameled-iron stand with cross arms at the top for supporting the motor, and also the clipper when it is not in use, is supplied as a part of the outfit. Power is transmitted by a flexible shaft of sufficient length to afford freedom of action for the barber. When desired, the clipper may be disconnected from the shaft and a vibrator attached in its place.



¶Because of the scarcity of leather, Dutch military authorities are to experiment with army shoes having wooden soles.

LIGHTNING BREAKS DISH HOLDING STEEL BEADS

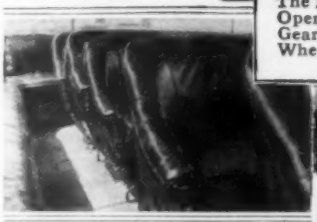
During a recent thunderstorm in New York state surprise and wonder were caused in a certain home by an unusual accident that accompanied a sharp bolt of lightning. The latter struck very close to the house in question, causing the telephone to "snap" so that those in the room heard it distinctly. Following this report a glass dish containing some steel beads, standing on a table about 12 feet from the telephone, broke into pieces, scattering the beads on the floor. The apparent explanation for the phenomenon is that when the lightning caused the spark at the telephone there was a discharge of electricity into the room and that the beads, being of polished steel with numerous sharp edges, offered a path of least resistance to the discharge, which, seeking a ground, burst the dish.

ALL-STEEL CHURCH HOUSES MEMBERS TEMPORARILY

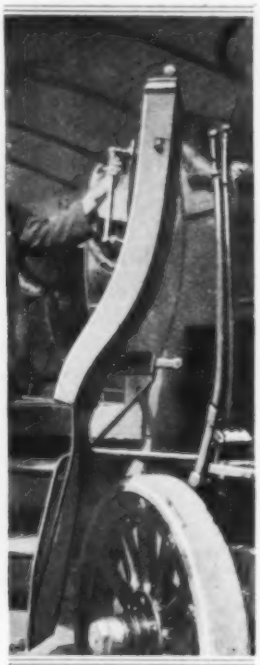
An all-steel church edifice is a novel, but serviceable, religious structure that has been built in Detroit to house a congregation temporarily. The walls are of steel panels which interlock in an ingenious way so that they can be taken apart readily when this building is moved to make room for a permanent sanctuary. The doors, window sash, and roof are also of steel. The interior is well lighted and has an attractive appearance. The exterior is painted light gray.

An All-Steel Church, Built for Temporary Use: Its Walls are Composed of Interlocking Panels Which can be Readily Taken Apart When the Time Comes to Move It to Make Room for a Permanent Structure

Thirty or More Persons may be Carried Comfortably in This Big Bus, Which Embodies a Number of Interesting Safety Features



The Bar Prevents Operation of the Gear-Shift Lever When the Door Is Open



A Glimpse of the Seating Arrangement is Given by the Picture in the Lower Left-Hand Corner. In the Middle, the Door is Shown Closed with the Steps Swung beneath the Car, While at the Right the Entrance Is Open

SAFETY-FIRST MOTOR BUS USED BY LAND FIRM

Seating space for 30 or 35 persons is provided in a motor bus used by a real-estate firm for conveying prospective purchasers to and from tracts of land that are being marketed. The vehicle was especially designed for this purpose and embodies a number of interesting features. The arrangement is such that practically all the available space is utilized without cramping the passengers. Cross seats wide enough for at least three persons are spaced along one side of the car. On the opposite side a long seat extends from the front and rounds the rear. Between the two is an aisle that gives access to the exit, which is immediately behind the driver's seat. The door and the steps leading to it are operated simultaneously by means of a lever. Except when the former is open, the steps are beneath the machine, out of the way. In the interests of safety, a mechanical connection has been made between the door and the gear-shifting lever so that the car cannot be started until the exit has been closed, or the latter opened while the machine is in motion.

NEW TESTAMENT IN KHAKI FOR FIGHTERS

Through the efforts of the National War Work Council of the Young Men's Christian Association, a million copies of a special army and navy edition of the New Testament are to be provided for American boys composing our fighting forces. The volumes are of pocket size and neatly bound in khaki so that they will withstand a certain amount of exposure and may be carried conveniently, whether the soldier is in camp or in the trenches.

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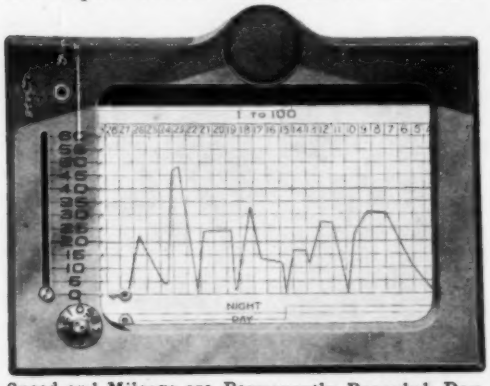
MOTOR-CAR SPEED RECORDER KEEPS PERMANENT RECORD

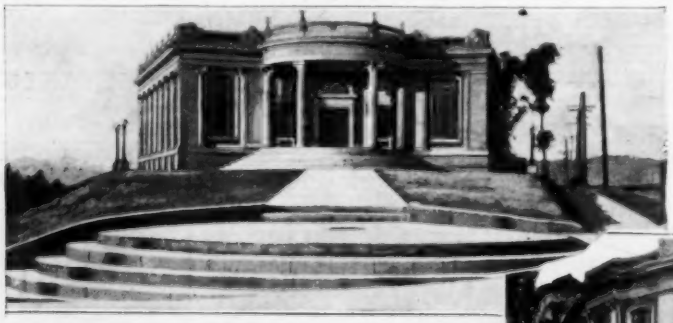
For motor cars a permanent-record speed and mileage register has been developed which has features of interest to drivers. The distance traveled and the rates of speed at which a machine proceeds while covering the mileage, are registered on plotting paper by a stylus. In a similar manner day and night driving is indicated. The perpendicular lines on the record sheet indicate miles of travel, while each horizontal one measures speed in multiples of five. The roll is of sufficient length to record trip and season mileage to 5,000, and at all times enough of it is visible to show the record for the 25 miles last traveled. By setting an indicator, the maximum speed may be limited to any desired rate, and when this is reached, ignition is automatically cut off and a warning bell sounded. The instrument offers employers an opportunity to keep a constant check on the drivers of their delivery and service cars, and also to prevent speeding.



Speed and Mileage are Permanently Recorded, Day and Night Driving Differentiated, and the Maximum Speed Controlled by This Register

PLAN OF LIBRARY ADAPTED TO ODD SLOPING SITE

A branch public library has been completed in a suburban district of Los Angeles, in the building of which unusual architectural and landscape problems were solved. The site selected was V-shaped being bounded by two converging streets, one of which slopes downward from the intersection past the site, while the other slopes upward past the site. The building faces the point of the lot and is surrounded by a lawn which has been skillfully leveled in front and sloped at one side toward the lower street. The entrance walk extends from the front of the building down to the street intersection, ending in circular steps which take up the slight difference in street levels at that point. An auditorium on the lower library floor has a rear entrance level with the lower street. The doorway, with sloping lawn on either side, is partially hidden.



Front View of Library Showing How Circular Steps in Foreground Take Up the Difference in Street Levels: Note That the Building's Plan Conforms to the Shape of the Lot

Rear View Showing the Street-Level Entrance to the Library Auditorium: The Steps on the Far Side Lead to the Higher Street Level

Showing Propeller and Hub, and Indicating Position of One Pin

Above, the Blades are Set at a Pitch of Four Feet Eight Inches

High Pitch, Showing Collar in Different Position than at Left

By Turning the Screw the Collar is Shifted and Pitch Changed

PITCH OF PLANE PROPELLER REGULATED IN FLIGHT

In an attempt to increase flexibility and efficiency, an adjustable-pitch propeller has been developed for aeroplanes. Both block and flying tests have been conducted and satisfactory results reported. Complicated construction has been avoided and positive control provided. A pilot can change the propeller pitch while in full flight and thus make compensation for whatever atmospheric condition is encountered. He accomplishes this even more easily than a motorist shifts the transmission gears of his car. In purpose and effect the two operations are practically analogous. Accurate adjustments are made by turning a screw which moves a collar mounted on the propeller shaft forward and backward. The angularity of two pins, which are hinged to the latter member and pass through holes in the bases of the propeller blades, is changed in this manner. Since the blades are mounted on roller bearings in the opposite ends of an aluminum hub, they are directly affected by changes in the angularity of the pins. When a plane is navigating in heavy atmosphere at a low altitude one minute, and soaring in thin air at a high elevation a few minutes later, different propeller pitches can be used and the motor protected from severe strains.

MAMMOTH ARMCHAIR MADE OF PAPER FIBER

The mammoth armchair shown in the accompanying illustration was built for advertising purposes and is made of twisted paper fiber reinforced with steel cores. It stands 7 ft. 2 in. high,

An Armchair, Seven Feet Two Inches High, Made of Paper Fiber Reinforced with Steel Cores

and the cretonne cushion is 4 ft. square and 6 in. thick. The boy scout standing in the chair is 4½ ft. tall.

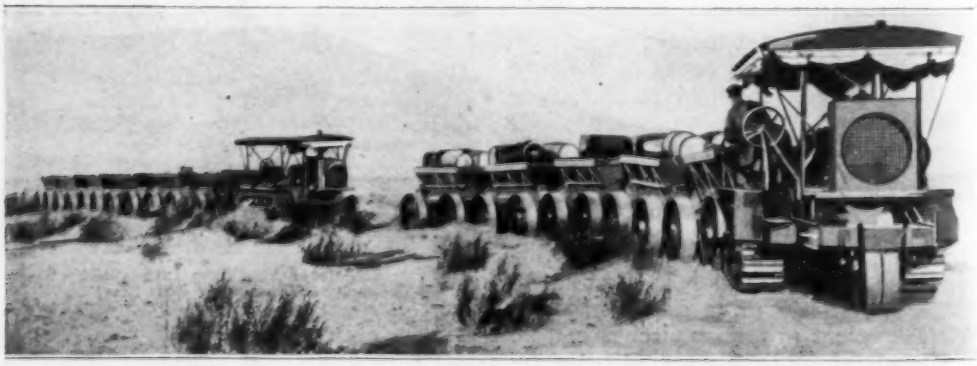
TRACTORS REVOLUTIONIZE DESERT MINING

Perhaps nowhere has transportation by motors brought greater changes than in desert mining. Rich fields which have long lain idle, or nearly so, because of the almost insuperable difficulties of carrying supplies and ore, have suddenly been transformed into scenes of big-scale industry by the coming of motors and tractors. The contrast in transportation methods is strikingly presented in the accompanying photographs. The outfit with the team of eight burros and two pack animals is typical of a day that is passing rapidly. With it a miner could transport but two tons of ore across the hot sands of the desert, traveling only about 10 miles per day. Instead of such primitive means has now come the tractor, hauling trailers which can carry 25 tons 20 miles per day. The rear wheels of these engines operate in endless corrugated belts which enable the machines to pull through the sand without sinking. In many districts such trains make trips to and from "civilization" on a regular schedule.

The Old Way: Eight Burros and Two Pack Animals Which can Carry Perhaps Two Tons 10 Miles per Day across Hot Desert Sands

RED CROSS SCHOLARSHIPS FOR TRAINED NURSES

The Red Cross has recently offered a number of scholarships to qualified nurses for an eight months' course in public-health nursing. It is pointed out that thousands of nurses are ready and willing to respond to a call from the Red Cross for war service, while comparatively few are prepared for constructive community health work, so important in conserving the interests of the home. It is particularly difficult to obtain women with adequate hospital training who are willing to go to the smaller communities. The scholarships, which are valued at $250 each, have been donated by various organizations and schools in eastern and middle-western states. The Red Cross offers to supplement the scholarships with loans of an equal amount. An appeal is being made to various local bodies to encourage nurses to enter this important but neglected field. Women engaged in the town and country nurs-



The New Way Which has Made Possible the Development of Many Desert Mining Fields: A Tractor and Its Trailers can Carry 25 Tons 20 Miles per Day

ing service, as this branch of Red Cross work is called, are not subject to call for other Red Cross duty outside their community.

NEWSBOYS ERECT PYRAMID TO FRIEND'S MEMORY

Unusual interest attaches to a massive pyramidal monument which was recently dedicated in a Toledo, Ohio, cemetery to the memory of a man long known in that city as a friend of the newsboys. As a testimonial of their regard the paper sellers, together with school children and many of the deceased man's admirers throughout the world, contributed the stone from which the monument was constructed

Recently Dedicated Monument in Toledo, Ohio, Constructed of Stone Contributed by Newsboys as a Tribute to Their Friend Who Lies Buried Here

and also funds for building it. At the dedication exercises the mayor of the city and other citizens made addresses.

NEW CRUTCHES FASTEN TO WEARER'S BELT

Wounded British soldiers have recently been provided with crutches of a new type which represent a decided departure from those commonly in use and are believed to possess special advantages. Instead of resting in the armpits, these artificial supports are hinged at either side of the body to a broad leather belt worn slightly above the waist. The crutches consist of telescoping tubes of steel fitted with aluminum sockets at the belt. They are

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British Soldiers Wearing Recently Designed Steel Crutches Which are Hinged to a Broad Belt Worn Just above the Waist

designed to give the wearer greater freedom in using his arms.

SUN SCREEN FOR BEACH USE HAS CONVENIENT FEATURES

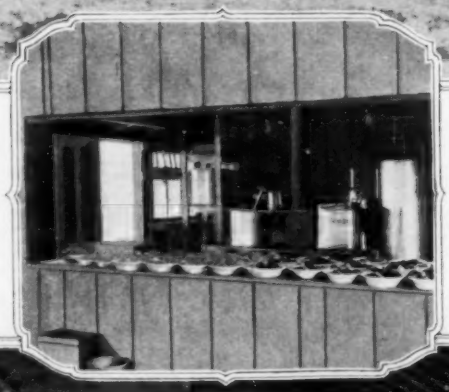
Excellent for those who frequently motor to the beach to spend an afternoon on the sand and in the surf is a collapsible sunshade that folds into a compact, flat parcel, small enough to be stowed in the tonneau of a car. The striped canvas that forms its tent-shaped top is held on spring rollers so that it may be disposed of like an ordi-

The Canvas Covering of This Beach Screen is Mounted on Spring Rollers Like Those of Window Shades

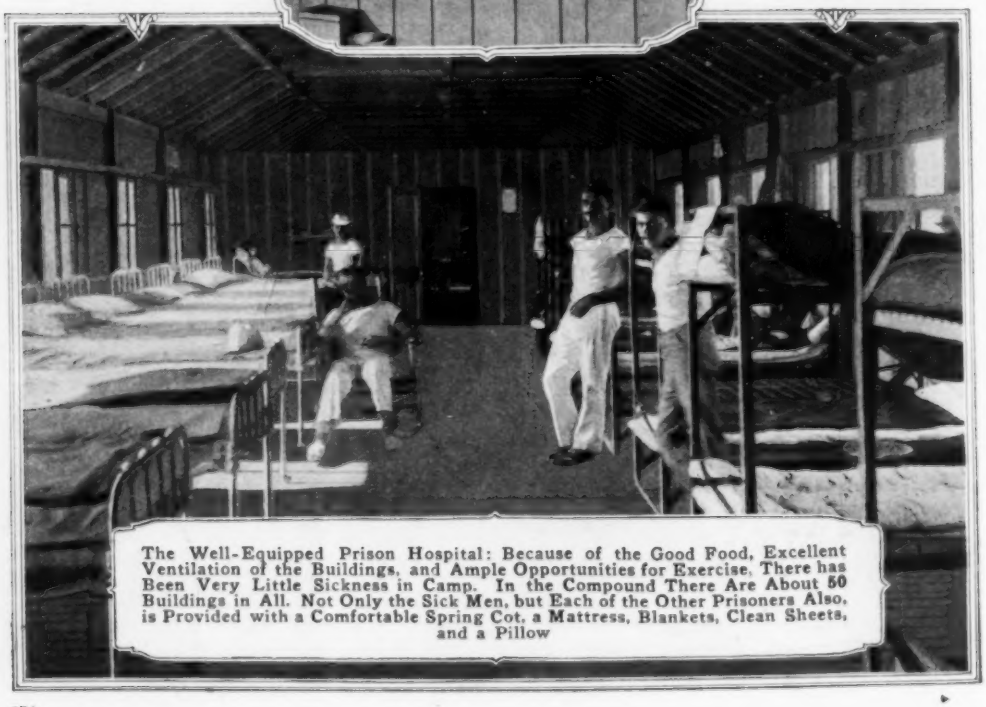
nary window shade. Since it is provided with four legs, it holds its own quite well in a strong breeze.

A PRISON CAMP FOR ENEMIES OF OUR COUNTRY

The Group of Prisoners Shown Above are Engaged in Carpenter Work for a Y. M. C. A. Building Which is Designed to be a Combined Theater, Music Hall, Gymnasium, Chapel, and General Assembly Room

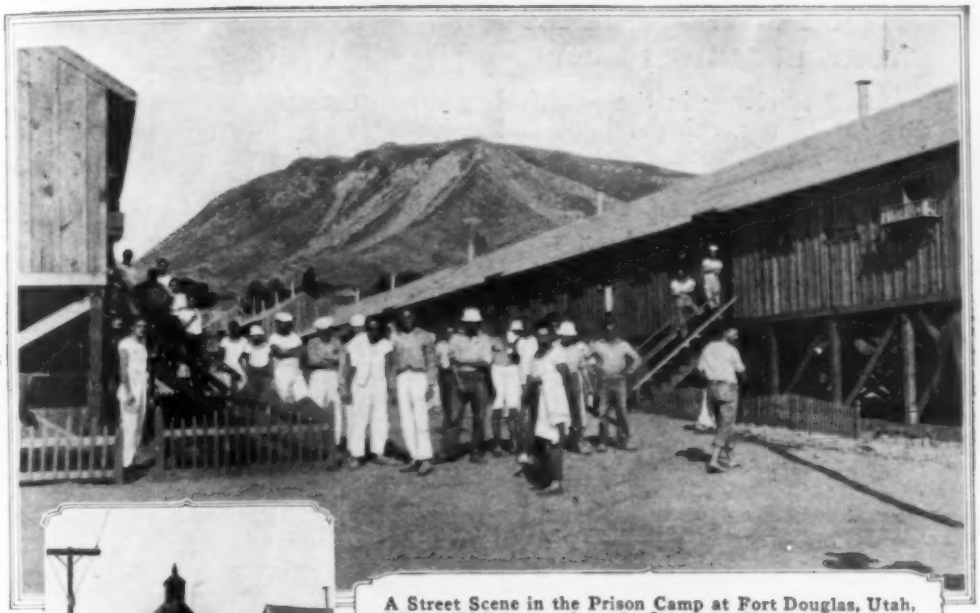


Dishes Ready for the Noonday Meal are to be Seen on the Left: Bread from the Same Oven That Supplies the Soldiers in a Near-By Camp Goes Also to the Prisoners. The Variety of Vegetables Is Large



The Well-Equipped Prison Hospital: Because of the Good Food, Excellent Ventilation of the Buildings, and Ample Opportunities for Exercise, There has Been Very Little Sickness in Camp. In the Compound There Are About 50 Buildings in All. Not Only the Sick Men, but Each of the Other Prisoners Also, is Provided with a Comfortable Spring Cot, a Mattress, Blankets, Clean Sheets, and a Pillow

IN WHICH NO "FRIGHTFULNESS" IS TO BE FOUND



A Street Scene in the Prison Camp at Fort Douglas, Utah, Where 320 Prisoners from the Commerce Raider "Cormoran" and about 60 Alien Civilians are Confined: Here can be Seen Some of the Little Fences Made by the Men from Scraps of Lumber to Inclose Their Beds of Flowers and Vegetables. As These Pictures Help to Show, Principles of Humanity Govern the Treatment of the Men

On the Left Is the Camp's Octagonal Bulletin Board, Resembling a European Kiosk, on Which are Posted Official Notices, Censored News Clippings, and Contributions by Prisoners

A Mess Hall in the Camp: The Men are Given Plenty of Wholesome Food, Including Vegetables They have Raised and Fresh Meat Issued in the Same Rations as to Our Soldiers. German Cooks Belonging to the Interned Crew Prepare the Meals. The Officers of the "Cormoran" Have Quarters Separate from the Men and the Routine of Camp Discipline is Maintained Largely through Them

One of the Few Inmates in the Camp Hospital—and He so Well He Is Able to Weave Souvenirs during Odd Moments: The Hospital Is in Charge of the "Cormoran's" Surgeon, and under the Supervision of Our Own Medical Officers. When Advisable, Special Diets are Provided for the Sick

METER TRUCK SIMPLIFIES WORK IN LIGHT PLANT

Increased efficiency in the electrical department of a municipal light and

A Truck Designed by an Electric-Lighting Plant Superintendent Which Enables One Man to Move a Number of Meters Quickly and with Little Risk of Getting Them Out of Order

power company has resulted from the use of a truck designed by the superintendent for carrying electric meters. The carrier is pushed by hand, has four rubber-tired wheels, and supports a steel rack with four crosspieces, on each of which 20 meters can be securely hung. The delicate instruments when transported in this way are less apt to get out of order than when carried about the plant in boxes, as is frequently done. It is obvious, too, that one workman can transport a large number of meters on this rack quickly and with little effort.

GOVERNMENT TO RE-EDUCATE OUR WOUNDED SOLDIERS

Our soldiers and sailors who may be maimed in this war are to be cared for more scientifically than has ever been attempted in previous conflicts, thereby showing that we have advanced not only in methods of fighting, but also in our conception of the nation's obligation to those who fight for it. In other wars wounded soldiers were kept in army hospitals until their wounds healed and then released to shift for themselves, aided by such pension money as they might obtain from congress. Now the government proposes to equip and reëducate every wounded man, after healing his wounds, so that he can return to a useful civil life. The best that surgery and the science of education have to offer will be employed in his behalf.

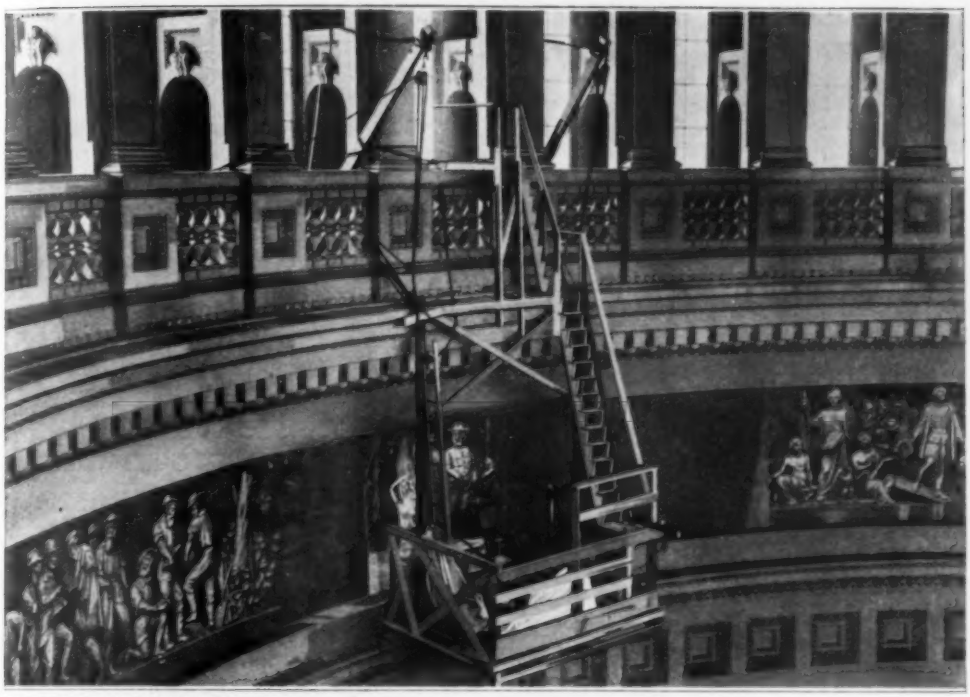
The first step in this splendid program will be the erection of "reconstruction hospitals," sites for which have been tentatively chosen in a score of large cities. Workshops will be provided in the hospitals where the convalescent soldiers' weary hours may be made more bearable and in some cases financially profitable. In addition, arrangements will be made with outside industries where more elaborate training can be carried on, and an employment bureau will be established to place these trained men in various parts of the country.

HOUSE MOVING IN JAPAN A SIMPLE PROCESS

House moving as practiced in rural districts in Japan is a far more simple procedure than it is in America. If an owner of one of the little houses typical of Japan's agricultural regions decides to change its location, it is only necessary to call in a score of neighbors, or as many laborers, and they will accomplish the task in short order, carrying

A Group of Natives in Japan Moving One of the Simple Houses Which Are Common in the Rural Regions of That Country

off the whole of the habitation on their shoulders, and incidentally illustrating an attractive aspect of the simple life.



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AT WORK ON HISTORIC FRIEZE IN CAPITOL

AN historical frieze, begun in the rotunda of the national capitol years ago by men no longer living, is now being completed by a well-known American artist. The railed platform shown here is suspended from the rotunda balcony, giving the artist access to the wall on which his predecessors have pictured scenes of early historic events. It is interesting to note that the additions now being made, subject to the approval of Congress, give generous recognition to American engineering and commercial achievements. Among the subjects treated are the application of steam to travel, the building of the Panama Canal, the harnessing of electricity, and the development of the modern battleship and aeroplane.

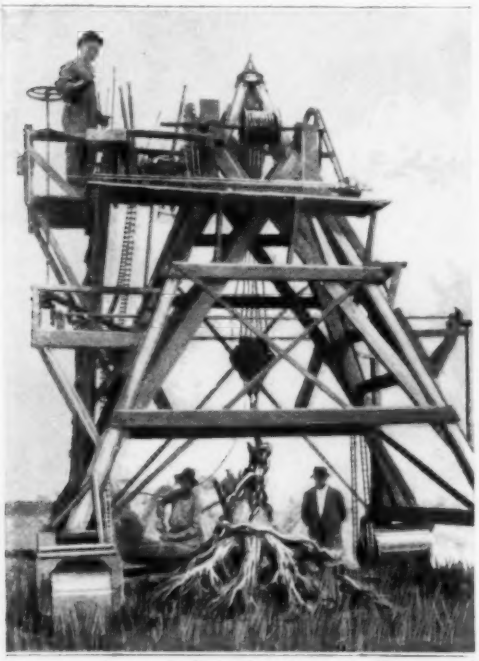
LOCOMOTIVE DESERTED FAR FROM RAILROAD

When a western river overflowed some time ago and flood water washed away $15,000 worth of track, a small locomotive that had been used in railway-construction work was marooned in a desert. Recovery of the engine will not be attempted, for its value is less by several thousand dollars than the cost of re-laying the rails to it. The locomotive has been stripped of some of its parts and abandoned. It presents a singular appearance, standing forlornly as it does, away from all vestige of habitation.

Abandoned Locomotive in Western Desert: It Is Too Far from a Permanent Railroad Line to Make Its Recovery Financially Practicable

POWERFUL STUMP PULLER OPERATED BY ONE MAN

An excellent feature of the powerful stump puller shown in the accompanying illustration is that it can be operated by one man who stands on a platform near the apex of the pyramidal wooden framework, some 15 or 18 feet above the ground. The machine is mounted on four broad-tired wheels and is driven by a gasoline engine that is also used to operate the block and tackle provided for pulling the stumps from the ground. The operator from his high platform steers the machine like an automobile, moving with fair speed from place to place. Not more than five or six minutes is required to set the outfit over a stump and extract it. The fact that the apparatus exerts a pull straight upward instead of sidewise enables it to remove a large proportion of the roots.

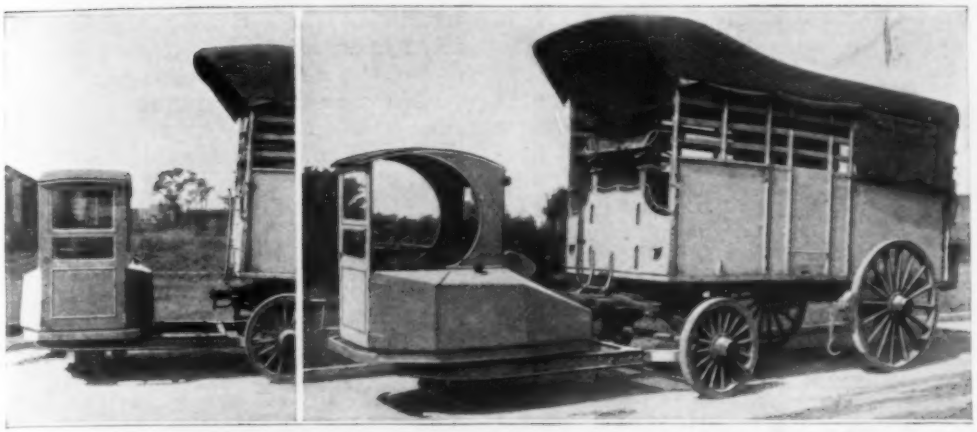


Powerful Stump Puller Which can be Driven and Operated by One Man: Not More Than Five or Six Minutes are Required to Set the Machine and Extract a Stump

SEVEN-PASSENGER LAUNCH A SPARE-TIME PRODUCT

The seven-passenger gasoline launch pictured in the accompanying illustration shows what an industrious carpenter with some mechanical ability was able to construct for his family's pleasure with a very small cash outlay. The craft was built during the owner's spare hours, three weeks being required to complete the 22-ft. wooden hull. A satisfactory gasoline engine was constructed from parts secured at junk shops and secondhand machinery shops. Installed, it proved to have ample power to drive the stern paddle wheel. An oilcloth top and side curtains enable the carpenter and his family to enjoy excursions on the near-by river in sunshine or rain. The total cash expenditure for the launch was $48, including hired help.

A 22-Foot Gasoline Launch Constructed by a Carpenter during His Spare Hours and Driven by an Engine Made from Parts Purchased from Junk Dealers and in Secondhand Machinery Shops



The Tractor is Provided with a Single 34-Inch Drivewheel, Is Capable of Pulling a Five-Ton Load, and, as Shown at the Left, can be Turned Around without Moving Its Trailer

TRACTOR WITH ONLY ONE WHEEL HAS MANY USES

Many uses suggest themselves for a one-wheel tractor which has just been put on the market and is capable of pulling loads up to five tons. It is designed to be coupled to any wagon of the horse-drawn type, making it unnecessary to discard such vehicles when giving up the use of horses. The tractor is equipped with a four-cycle gasoline engine inclosed in a small metal body, of which an upholstered cab for the driver is a part. The unit rests on a 34 by 10-in. drivewheel and is so mounted on the steel frame, with which a coupling is made to the vehicle behind, that it can be turned completely around without moving the load. This feature, together with the fact that it occupies less space than a team, makes the tractor very serviceable for any hauling which involves maneuvering in cramped quarters. It is claimed that the engine can operate more efficiently than the ordinary motor truck because it pulls its load instead of pushing it, as is the case when power is delivered to rear wheels.

¶Candles, designed especially for soldiers in the field, are now being manufactured which have a base so broad that they can stand alone. This feature makes the use of holders unnecessary.

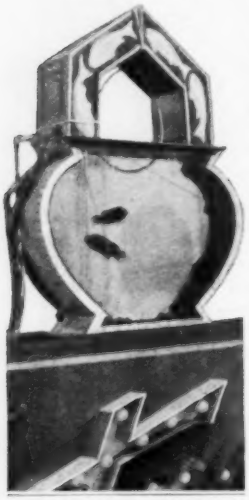
ADJUSTABLE SUPPORT FOR BROKEN LIMBS

Tests of a new limb support which have been made in a hospital in this country have proved so satisfactory that a Red Cross unit will take one of the devices to France, together with specifications for making others if desired. It consists of a hammocklike sling suspended from a steel arm that can be attached either to a bed or a wheel chair. Its special feature is the freedom of movement that it affords the patient. By means of a rope and pulleys the sling can be raised or lowered, while the supporting arm permits it to swing from side to side.

A Special Advantage of This Support for an Injured Limb Is That It can be Raised, Lowered, or Swung to Either Side. The Method of Attaching It to a Bed is Also Shown

LIVE FISH IN CAFE SIGN ATTRACT BUSINESS

Originality and unusual effectiveness have been displayed by a café owner who has incorporated a fish bowl containing live fish in an electric sign above the entrance to his establishment. The eating house makes a specialty of fish and by displaying lively sea bass in such an unusual place the public's attention is sure to be arrested. Three pipes are connected with the aquarium, one supplying clean water, another air to aerate the water, and a third serving as an overflow. At night the sign is illuminated with flashing light bulbs. The fish are supplied with food by means of a small cup attached to the end of a long pole.



NEW FLOATING MINE WRECKS ONLY ENEMY VESSELS

Our government has under consideration a marine contact mine of an unusually interesting type. It may, or may not, prove to be suitable for general adoption, but at any rate it has the merit of ingenuity and therefore is worth notice. Unlike ordinary mines, this one operates on a selective principle. In other words, it is designed to destroy enemy vessels without endangering the friendly ones that collide with it. Technical details of the invention cannot, of course, be divulged, but a general description is permissible. The outer shell of the mine is built of pressed steel and equipped with a group of magnetic disks, which are employed in place of the firing pins customarily used. The instant that steel, iron, or any similar metal comes in contact with one of the disks, a clock motor, housed within the buoy, is set in motion. It in turn operates a trigger and causes the discharge of a fulminate cap that detonates the explosive. Thus any unprotected steel vessel would explode the mine on contact. In order, however, that our war and merchant vessels and those of our allies might safely proceed through a field strewn with such weapons, the inventor has provided a simple means of protection which prevents explosion of the mine upon contact with a so protected vessel. The magnetic disks covering the outside of the mine are made of a special metal, the character of which is withheld from publication. It is easily procured in large quantities and is understood not to be of excessive cost.

STEAMSHIP LINE ADOPTS NEW LIFE PRESERVER

A life preserver made in the form of a vest that can be worn continuously if desired, has been marketed recently. One article of this sort is now being issued to each passenger on one of the large transatlantic steamship lines. Encircling the vest is an inflatable belt which lies flat when not filled with air, causing the wearer no inconvenience. It can be inflated in any emergency merely by blowing into a rubber-tube attachment with which it is provided. The mouthpiece of the tube is a valve which can be opened and closed as desired. A heavy strap is attached to the back of the garment, and it is claimed that when the belt is inflated it is capable of supporting three persons in the water. The protection against cold which the vest affords is also an excellent feature.

Part of a Herd of Elk Cows and Yearling Calves in Genesee Mountain Park, 22 Miles from Denver: Because of the Exceptional Natural Advantage Offered by This Large Game Preserve, That City Is Able to Maintain Unusually Fine Herds of Wild Animals

VACATION RESORT FOR WILD ANIMALS MAINTAINED BY DENVER

UNTIL two years ago governmental efforts to conserve the nation's game supply had been limited to laws and reservations created by acts of Federal or state governments. At that time the city of Denver entered the game-preservation movement as a development of her mountain-park system. So marked has been the success of the movement that it opens an important war-time possibility for cities that wish to supplement their meat supply. Denver's game sanctuary has not been developed with this idea in view as yet, but has reached a stage where such a movement could be quickly carried out.

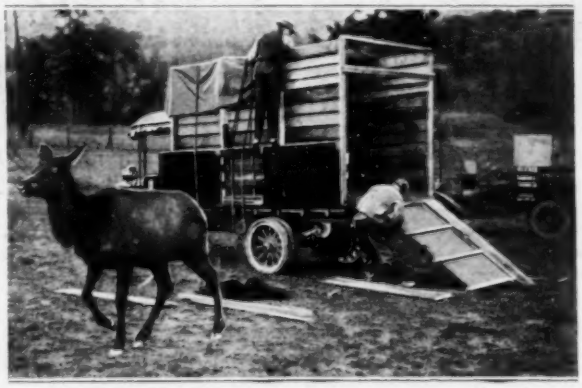
Denver's mountain game preserve includes 400 acres of fenced land in Genesee Mountain Park, 22 miles from the city. The preserve is well timbered, and consists of rolling meadows, deep ravines, and rocky points, jutting forth from the sides of Genesee peak, 8,270 ft. in elevation.

Five varieties of western game animals, representing types from prairie to mountain peak, have been introduced and have thrived. The buffalo and antelope of the prairies, the elk and deer of the mountain forests, and the big horn of rocky peaks above the timber line, are all found within the preserve. The elevation, ranging from 7,500 to 8,000 ft., has agreed with all. Increase in the herds has been even more pronounced than under natural conditions, for the predatory lions and wolves cannot enter the Genesee preserve. The elk have shown great reproductive power, the herd increasing as readily as cattle. The yield from the cows, even with some immature animals in the lot, has been about 75 per cent of their total number.

Buffalo Swimming through a Vat Filled with a Disinfecting Bath: This Precaution is Taken so That These Animals will Not Transmit Disease to the Park Herds

The improved vitality of the animals after reaching the mountains is noticeable even to the unpracticed eye. Results have shown that this improvement has extended to increased productiveness and stronger individuals among the young.

Surplus ruminants, born in the city zoo, are sent to the mountains as soon as they are able to care for themselves. Indeed, the city now keeps only three or four of each species of ruminants in the zoo, revitalizing the stock by interchanging individuals as soon as the zoo specimens begin to show the effects of close confinement. The result of this policy is that the Denver zoo specimens of big game are always in the finest possible condition.



The Truck in Which the Wild Animals are Transferred to the Mountain Game Preserve: A Tarpaulin Covers the Crate so That the Creatures will not be Unduly Frightened

A tremendous saving in feed bills has been an indirect result of the creation of the preserve. Formerly the city kept 20 buffalo and about 40 elk in its city park. This number has been reduced until about a half dozen of each species are now in the city, the remainder being in the mountains. The Genesee elk herd now numbers about 100 animals. The native grass and shrubs in the preserve are so abundant that the animals require no hay except after a very heavy snowstorm. One ton of hay a winter for 10 animals is about the amount consumed by the Genesee herds during an average winter.

Some of the animals are visible at all times of the day from the road that skirts the preserve, or from that branch which passes directly through it, dividing it into two sections. The pleasure afforded motorists by such sights is one of the strong attractions of the mountain-park drive.

Construction of the fence, transportation of the animals, and trapping of new specimens have developed some ingenious devices. The fence is constructed of heavy stock wire, strung upon iron pipes from the boilers of discarded locomotives. These pipes, bored with holes for attachment of the stock wire, are each sunk in 2-ft. concrete bases, and have withstood charges from buffalo and elk without a sign of weakness. The pipes were bought at $7 a hundred, but surrounding stockmen adopted the idea eagerly, with the result that the price rose to $14 a hundred by the next summer. This was before the war prices seriously affected scrap iron such as that utilized.

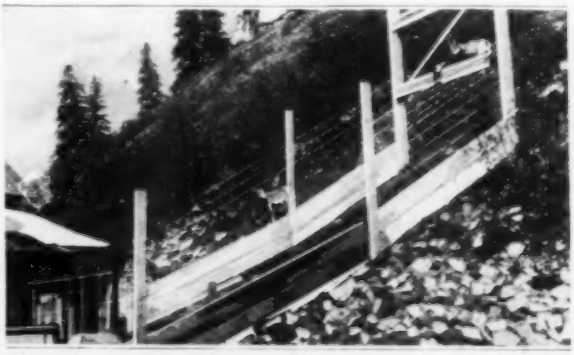
A unique feature of the preserve is a subway built beneath the auto road that bisects the inclosure. Some doubt was expressed as to whether the ani-

Some of the Park's Fine Specimens of Buffalo Which have Sought Out the Snow-Covered Uplands for Food: Even in Winter They Are Able to Obtain Most of Their Food Themselves

The Viaduct beneath the Automobile Road That Cuts the Preserve in Two: Contrary to the Predictions of Some, the Wild Animals Use This Passageway Freely. An Antelope is Shown About to Enter It

mals would use this, but they speedily justified the faith of the zoo superintendent by passing through freely. The subway is walled on either side with rough stone and may be closed to create a winter range if a drought should make this desirable.

No animals are introduced into the game sanctuary, whether taken from the zoo yards or the wild, without first having undergone two dippings at an interval of 10 days. This is to eradicate any skin disease the animal might have contracted. A concrete vat at the city yards is used for the purpose. Animals are driven through a high board chute into the vat, which contains warm water into which eight pounds of carbolic acid has been mixed. After the second dipping the vat is boarded over, a motor truck backed against the end of the chute and the animals are driven into it. An immense wooden crate, built upon the truck, holds the animals securely. Partitions in the crate prevent the animals from crowding to the rear end and injuring one another as the truck ascends the mountain grades, while tarpaulin is drawn upon the crate to shut out the sights of the road. Wild animals are nervous creatures and might easily injure themselves against the walls of the crate if frightened.



Trapping Mountain Sheep: The Gate Uphill is Sprung When Sheep Enter and These are Then Driven into the Cabin Below, Which is Heavily Padded to Prevent the Animals from Injuring Themselves

The latest addition to the game preserve is a bunch of six mountain sheep, trapped at Ouray, Colo. The sheep entered the trap to secure hay and were held by a spring gate. The secret of the trap's success lies in the fact that its entrance is uphill. The sheep always flee upward when pursued and will enter no trap where they cannot see an unobstructed road to their peaks. The five ewes captured each yielded two lambs.

BODIES OF SERVICE CARS RESEMBLE GARAGES

For the accommodation of motorists of an eastern city and its environs, a new automobile service, based on an interesting plan, has been instituted. Conducted as an association, the firm makes members of its patrons and, for a prescribed annual fee, renders emergency service to stalled cars whenever summoned. The company's motto is, "We bring the garage to you," and in carrying it out, the service cars have been equipped with bodies that resemble small brick buildings. The machines, of course, carry fuel, oil, water, tire pumps, and various tools in addition to whatever parts or accessories may be needed by the machine requiring assistance. If a member's car becomes stalled in the mud near the city, has engine trouble, a flat tire, uses up all of its gasoline or oil, a call sent to the station brings immediate help.

The Service Cars Are Distinctive, for They Embody the Association's Motto, "We Bring the Garage to You"

CROSSING THE BUFFALO WITH BEEF CATTLE

Efforts made during the last 25 years to produce a hybrid, domestic animal, by crossing the native buffalo with the black Galloway, or polled Angus, strain of beef cattle, can now be summarized. The hybrid is known as the "catalo." A considerable number have been bred and their characteristics carefully watched by the experimenters. The largest herd is located on the isolated, uninhabited "Arizona strip," north of the Grand Cañon. While the herd roams free, as did the buffalo, without herder or any special attention except at breeding and calving times, the catalo submits readily to confinement and domestication when desired to do so. Like the buffalo, it requires little water and is successful in evading beasts of prey. Its roving habits prevent fattening and the meat resembles buffalo meat, though a little better. The cows produce only sufficient milk for their young. Catalo sell for park-exhibition purposes at $500 to $750 apiece, and their black-haired hides bring from $50 to $250 each, for use as robes and rugs.

A Yearling Catalo, or Cross between a Buffalo Bull and a Galloway Cow: These Hybrid Animals, Bred in the West, Submit to Confinement and are Sold to Parks, While Their Hides Furnish Better Robes and Rugs than the Original Buffalo

Above: The Mouth of Tunnel Extending under Piles of Material. Below Is a View of the Shovel That Pulls Itself on Skids

The Extensible Conveyor Platforms over the Piles are Shown Above. Below Is a Rear View of the Steam Shovel in the Arroyo

End View of a Dump Car, Showing the Manner in Which It is Automatically Tilted to Discharge Its Load into the Crusher

LARGE GRAVEL PLANT USES LABOR-SAVING METHODS

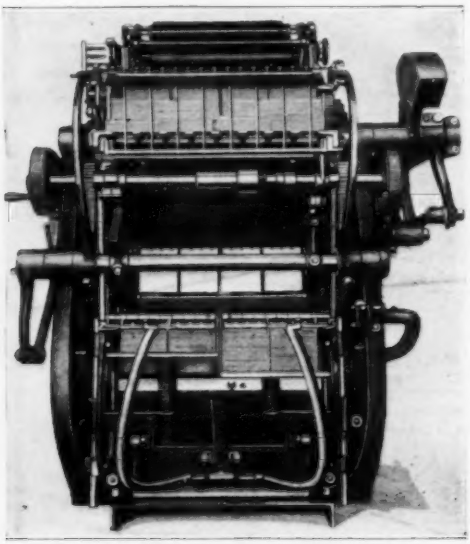
Interesting labor-saving methods of handling large quantities of sand and gravel are practiced by a concern obtaining its material from an arroyo which is dry nine months of the year. Low-cost storage is particularly essential for this plant because large stores of materials must be gathered to last through the wet season when the arroyo is flooded. The unsorted stone is dug up by a steam shovel mounted on skids. By means of an extra winch mounted on the shovel, together with a pulley anchored at the proper distance, and a cable connecting the two, the shovel is able to pull itself along, bringing new gravel deposits within reach. Thus no time is lost in using rollers.

The dump cars, which deliver stone to the plant's crusher, are drawn up an incline by a cable and dumped automatically at the top. Two small supplementary wheels are mounted on the extended ends of each car's rear axle. On reaching the top of the incline these wheels start to travel up slanting beams and so tilt the load forward. At the same time a catch holding the door at the front end is released and the stone is discharged. For the purpose of providing conveyors whose range can be extended as the piles of sorted material grow, sets of cables have been stretched from the crusher to points beyond the piles. Frame sections are laid on these wires to form suspended supports, to the end of which the sand or stone is carried and dumped.

In order that the sorted material may be easily loaded for delivery to purchasers, a tunnel has been built beneath the piles, its top and sides being reinforced with 8-in. square beams. Into this passageway the delivery trucks are driven and then loaded by opening a slide and letting the desired amount of sand and gravel fall through into the vehicle.

FAST PLATEN PRESS PRINTS FOUR JOBS AT ONCE

Of late a printing press capable of handling four separate jobs at once and feeding stock that varies in thickness



The Feeding Device, as Shown Above, Is Capable of Four Subdivisions. It Also Permits Paper of Two Different Thicknesses to be Run Simultaneously

from thin tissue to four-ply cardboard, has been introduced in this country. It is said to do three-color process work as well as cylinder presses, and produces solid tints that show no mottling. In addition to being of simple enough construction that any pressman can familiarize himself with the mechanism in a few days, it will turn out from 2,500 to 3,200 impressions an hour, the speed depending, of course, upon the class of work in hand. The feeding device is capable of four subdivisions and permits two different thicknesses of paper to be run at the same time. Delicate regulation of the suction force obviates the chance of more than one sheet of paper being fed at once when tissue is used. Two gripper arms convey the printed sheets from the platen to the delivery board, where they are jogged into even stacks. The board is arranged at a convenient height so that an operator can inspect the work as it is run off, without stooping. The machine is driven almost noiselessly by a one-horsepower motor. With the aid of a helper to handle the stock, one pressman can operate two of the presses simultaneously.

OVERCOMING CAMOUFLAGE WITH HUED SCREENS

An American physicist believes that the advantages of camouflage—or at least certain kinds of camouflage—can be overcome by an opposing army by providing its airmen and other scouts with colored glasses or screens of contrasting colors to use with field glasses. When the colors of these screens are properly selected, uniforms and other objects may be made to appear in contrast, instead of in harmony with their surroundings, he claims. Camouflage as practiced in many cases is accomplished largely by the use of paint, objects being given shades that blend with the landscape. In spite of certain difficulties that would arise, it is believed that such efforts at concealment could be rendered quite ineffectual by the means stated.

LAMPS IN HUDSON STRAIT MARK ROUTE TO ENGLAND

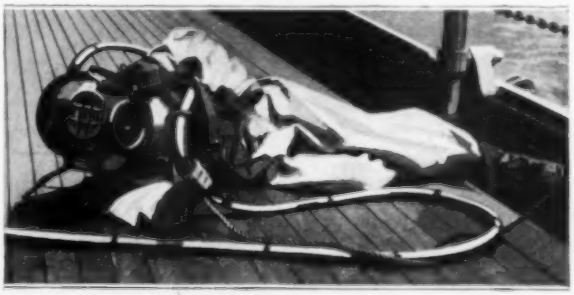
The completion of the railroad line to Port Nelson on the west coast of Hudson Bay has opened a new direct route from western Canada to England through Hudson Strait. The accompanying illustration shows one of the mast lights which are being installed in these straits, pending the erection of more permanent lighthouses. It is anticipated that henceforth much of Canada's wheat crop will travel via this route to the motherland, as will also Canadian oil for the great British war fleet.

SUBMARINE WARFARE INCREASES DEMAND FOR SKILLED DIVERS IN NAVY

THIS is a war of the fishes. Not only great armored submarines but man himself must go alone into the mysterious depths of the sea if he would win. Formerly each battleship carried its divers and diving outfit for use only in an emergency. Simple underwater repairs to the bottom or propeller were sometimes necessary after grounding or other accident. Survey of the damage could thus be made and temporary patches put on.

Then torpedoes came into general use in the fleet. While a few ran and floated, the majority wobbled and sank. They are worth about $10,000 apiece. To avoid vast unnecessary expense, special divers were trained to look for lost torpedoes. Only an expert can handle one of these grease-slimed bodies under water. At a touch from an unpracticed hand it may leap away with knifelike propellers spinning at terrible speed. Also the "stink pot," or torch, in the nose is likely to burn a hole in the diver's suit and drown him before he can be hauled to the surface.

In the past few years submarines have come to the front—lately they have made the front! Our own navy has had very few casualties with them. Year before last, Lieutenant Ede, U. S. N., took his ill-fated boat down in the harbor of Honolulu, never to rise again. Her horizontal rudders jammed and she sank in over 150 ft. of water. Divers heard men inside hammering — apparently trying to fix the pumps that she might be floated; all, however, were suffocated.



A Modernly Equipped Diver Ready for the Descent: His Suit Proper Is of Rubber and in One Piece. For the Sake of Freedom of Movement His Hands Are Bare

England, France, and Germany have paid the penalty of their submarine activity. Collisions and explosions have caused the loss of many boats, their crews dying like cats in a bag. Divers were always sent down, but frequently the water was too deep for rescue work of either men or submarine.

Submarine nets now set new problems for the diver. He must be plumber and fitter and general mechanic under water to a degree of skill never before thought possible. The latest nets are too heavy for quick hoist. When a section needs repair the shortest method is by divers armed with pliers, hammer, and even anvil, lowered over the side.

Resistance of the water impedes all movements of the diver. Quick blows or sharp wrenches are beyond any but the most powerful men. One may notice in the accompanying photograph that the man's hands are bare. His wrists and arms are covered by only the thinnest rubber in order to give him all possible freedom.

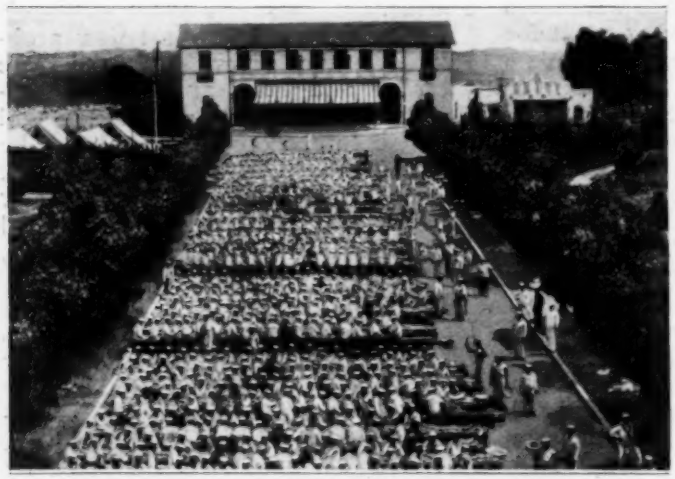
The suit proper is of rubber and in one piece. The helmet is attached by clamps lined with metal-protected gaskets; the boots are heavily weighted with lead plates, and the line for lowering and signals is attached to the shoulders and carries with it the air hose.

In the United States Navy, submarine crews receive $5 a month extra and $1 for each day during any part of which they have been below the surface of the water. Divers earn a bounty of $1.20 an hour or fraction thereof while at work.

Diving is like flying: easy, interesting, and pleasant until something goes wrong. Then, "Cross your fingers, Jack, or your name is Mud!" River mud, for the crabs and little fishes. . . .

OPEN-AIR EATING PLACE AT TRAINING STATION

Eating in the sunshine under a blue sky is the delightful year-around privilege of the young men of the naval training station at San Diego, Calif. Here in a broad plaza bordered on either side by shrubbery and, at one end, by one of the exposition buildings, long tables are set for the future sea fighters, several hundred of whom can be seated at once. The structure shown in the illustration was formerly the Fisheries Building and is now used as a bathhouse.



Beautiful Spot in San Diego, California, Where Sailors in Training Have Mess the Year Around: The Exposition Building in the Background is Used as a Bathhouse

¶An exceptional record in shipbuilding was made recently at Kobe, Japan, when a 9,000-ton steamer, complete with engines and masts on board, was launched in two months and 27 days after laying the keel.

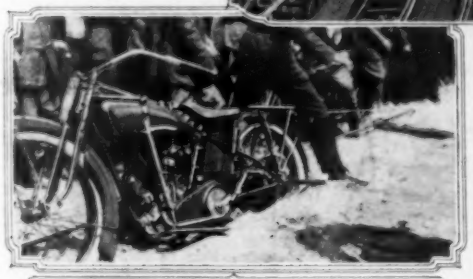
MINERS' CLOTHING DRIED BETWEEN SHIFTS

It is no longer unusual for a mining company to provide a respectable "change house" for the convenience of its employes, since production is known to suffer in the end if men are allowed to work in damp clothing, or are not enabled to replace wet, mud-soaked garments with dry ones before leaving for their homes. At one mine the change house is equipped with shower baths, stationary laundry tubs in which dirty clothes may be washed, and other serviceable facilities. When a miner removes his working apparel, he attaches it to a hanger fixed on a chain that passes around a pulley near the ceiling and hoists it overhead. Steam pipes in the upper part of the room keep the atmosphere hot, so that by the time the clothing is needed, it is dry.

One Section of a "Change House" in Which Provision is Made for Drying the Work Clothes of Miners

UNUSUAL CYCLE EVENTS COMMAND INTEREST

Signal-Corps Dispatch Rider Winning One-Mile Deep-Sand Race in the Remarkable Time of One Minute 22⅘ Seconds, a Contest That Severely Tested Both Machine and Operator



While the Tug of War Lasted, the Little Machines Roared, Bucked, and See-Sawed, Throwing Sand High in the Air Until Their Rear Wheels had Cut Such Deep Ruts That Traction Was Out of the Question. The Picture Above Gives an Idea of This

Thrills Galore are Afforded When a Motorcycle is Substituted for a Roller-Coaster Car. The Two Pictures Give Glimpses of One Fellow Who has Learned It to His Own Satisfaction without Mishap

Motorcycle Tug of War between Two Teams of Six Riders Each: The Machines were Hitched in Tandem at Opposite Ends of a Heavy Rope. The Contest Lasted 10 Minutes, and the Winning Team Pulled the Losing One 12 Feet 8 Inches

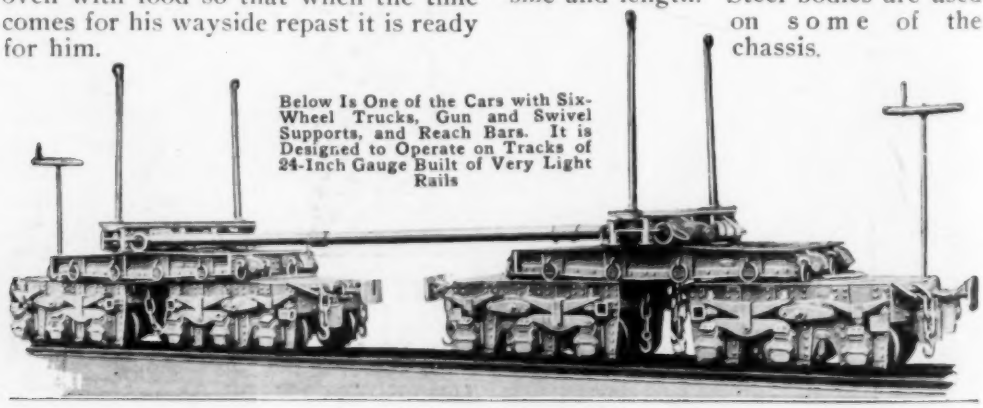
MOTORIST PREPARES MEALS IN GAS-HEATED OVEN

When on cross-country tours a resourceful motorist cooks his meals by utilizing the heat radiated from the exhaust manifold of his engine. For doing this he has a metal box heavily lined with asbestos mounted beneath the hood. The manifold passes directly through it. Potatoes packed solidly in the oven thus formed are baked to a turn in two hours. Canned beans are piping hot and ready to serve in even less time than that. A couple of hours before mealtime, the motorist fills the oven with food so that when the time comes for his wayside repast it is ready for him.

When Camp is Pitched after a Long Drive, It is Comforting to Raise the Hood of the Car and Find a Meal Ready to Serve

GUNS CARRIED ON SPECIAL NARROW-GAUGE CARS

For transporting heavy guns at the front, rolling stock of interesting character has been supplied for the French artillery. It is designed to operate on tracks of about 24-in. gauge that are laid with very light rails built in sections on pressed-steel ties. Special all-steel, four, six, and eight-wheel trucks are employed. For heavy duty they are coupled in pairs, equipped with gun and swivel supports, and connected by telescoping reach bars. A car of this type is able to run over uneven track and around sharp curves while carrying a considerable load. Furthermore it is of exceedingly simple construction and therefore burdened with no unnecessary weight. The length over the buffers of the six-wheel trucks is about six and a half feet and the width slightly under four feet. Being of heavy capacity they may be arranged in groups for carrying any heavy material. A pair, for instance, may have swivel supports, be connected by reach bars, and used to transport either timber or steel. Two pairs, in turn, each connected by a platform surmounted by swivel supports, may be joined with lengthened reach bars and made to carry approximately an 80,000-lb. load. Eight-wheel trucks are of heavier construction and correspondingly greater capacity. Because of this they are particularly suited for handling long, heavy timbers and materials of similar size and length. Steel bodies are used on some of the chassis.



Below Is One of the Cars with Six-Wheel Trucks, Gun and Swivel Supports, and Reach Bars. It is Designed to Operate on Tracks of 24-Inch Gauge Built of Very Light Rails

An Anchored Scow with Which Water is Kept Moving through a System of Canals by Driving the Rear Paddle Wheel at Full Speed: Scum and Débris are Collected in a Net Stretched across the Channel

SCOW MAKES ARTIFICIAL CURRENT IN CANALS

The water in a system of canals, which serves as a substitute for streets at an ocean resort in California, is kept clean and wholesome by means of a current created by a paddle wheel on an anchored scow. This craft is 36 ft. long and 16 ft. wide, while the paddle, mounted at the rear and driven by a 25-hp. engine, is 4 ft. in diameter and 8 ft. wide. Spuds hold the scow stationary while the engine is run full speed ahead, thereby causing the water to flow swiftly. A net stretched across the canal catches the débris and scum. The canal system is directly connected with the ocean, but gates are employed to prevent the variation in water level which the tides would cause and so the channels are not cleansed by natural means. A small clamshell bucket mounted on the scow is used for minor jobs of dredging which must be undertaken from time to time to keep the artificial waterways at the proper depth.

¶Work has begun on the strengthening of the southeast pier in the transept of St. Paul's Cathedral, London. The southwest pier, which has been under repair for nearly four years, will, it is hoped, be relieved of its disfiguring scaffolding soon.

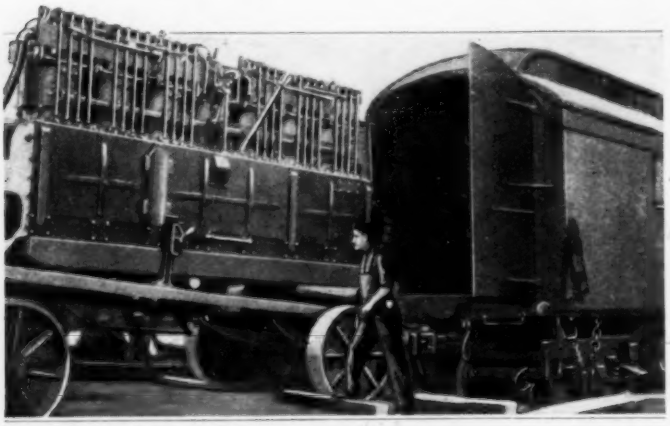
GIRL YEOMEN COMMON SIGHT AT OUR NAVY YARDS

Since our entrance into the world conflict many young women have enlisted in the navy as yeomen and been detailed to navy yards and recruiting headquarters for clerical work. The uniform provided for them consists of a short skirt and blouse of blue, and a white cap. These girls are executing shore work that relieves a corresponding number of youths for service afloat and so are doing their "bit."

Ahoy! My Lads. Three Jolly Jack Tarettes: They Are Yeomen Assigned to the Charlestown, Massachusetts, Navy Yard Where There Is Much Clerical Work to be Done. The Uniform Is "Regulation"

ENGINE IS RUSHED ACROSS COUNTRY BY EXPRESS

When quick delivery of a large oil-burning marine engine became imperative recently, it was dispatched across the continent by express. The motor, as shipped, weighed about 25,000 lb. and was loaded through the opened end of an express car, securely blocked, and sent on its journey.



Transferring the Engine from a Truck to the Express Car Preparatory for the Fast Transcontinental Trip

MANUFACTURE OF GLYCERIN FROM SUGAR WAR TRIUMPH

Government chemists working in co-operation with the Council of National Defense have evolved a process for obtaining glycerin from sugar. The discovery is one of immense importance, for it not only offers a way of conserving our supply of fats, but also cuts the cost of manufacture to approximately one-fourth the current figure. With sugar at the present market price, glycerin can be produced for about 25 cents or less a pound. Lack of some such process as this has been a serious embarrassment to the enemy, for the need of glycerin in the manufacture of explosives has been largely responsible for the great consumption of fats vitally needed for food and other purposes. Germany has even been forced, for this reason, to discontinue the manufacture of soaps and other articles of necessity.

SOLEMN STATUES SERVE AS ODD BEEHIVES

A quaint, solemn row of statues representing Moses, the apostles, high priests, monks, and other ecclesiastical personages, constitutes what is undoubtedly a very picturesque set of beehives. These figures which house many swarms of bees are the cherished possession of a landowner in a little village in Silesia, Germany, and had their origin in the sixteenth century. Efforts have been made by collectors of antiques to purchase them at various times, but their possessor has always refused the tempting offers. A long wooden shed open at one side protects the figures from the weather.

These Quaint Representations of Biblical and Ecclesiastical Characters Are Beehives and Are the Prized Possession of a Landowner in Silesia, Germany

HANDY TWO-WHEEL TRAILER FOR COAL DEALERS

To the coal dealer who fills many small orders of a ton or less, a new two-wheel trailer should make a special appeal because it is light, easily emptied, and can be quickly attached to the rear of a runabout. The wheels are rubber-tired, while the metal body is V-shaped and mounted on curved flanges bolted to either side—an arrangement which permits it to be tilted backward for instant dumping. Chains wound on a ratchet-controlled drum hold the body upright. The trailer is attached to the rear of a runabout by means of a fifth-wheel coupling which is installed after removing the rear deck of the car. When the trailer is not employed, the part of the coupling permanently attached to the automobile can be concealed by replacing the deck. This trailer can be drawn many places where a regular truck cannot, such as in narrow alleys, across thinly cemented driveways, and the like.

A One-Ton Coal-Carrying Truck That can be Quickly Attached to a Runabout: The Illustrations Show How It Dumps and Also How Coal in Sacks can be Carried

UTILIZE BOWLDERS PICKED UP ON DESERT RANCH

Bowlders collected on a large ranch in a semiarid region were used to excellent advantage in building a serviceable and inexpensive support for a tank that was a part of the water system on the property. The walls, composed of stone set in concrete, are 2½ ft. thick at the base and 1½ ft. thick at the top. The roof is reinforced with steel beams to help support the tank above.

By Utilizing Bowlders Picked Up on His Land a Rancher Was Able to Build a Tank House at Low Cost

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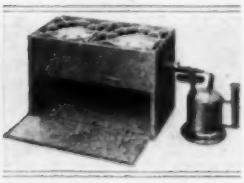
¶ Periscopes have been installed in a power plant recently, with no hostile intent, however. In the past, in order to read the temperature of the oil in the transformers it has been necessary to mount a ladder, but with the new apparatus that inconvenience is overcome.

POWERFUL GAS LAMPS LIGHT GUARDED DAM

Several portable gasoline searchlights of about 25,000 cp. were recently constructed for use in illuminating at night an important dam in the West which is constantly guarded. The lamps are assembled in compact form and might be employed for any of a number of different purposes in districts where electricity is not easily available. The projector is mounted above an oblong case that incloses the fuel and pressure tank and all operating valves. A 14-in. silvered reflector backs a group of ordinary gas mantles. A brilliant flood of light is thrown in a wide angle. The unit is about eight feet in height and can be moved without difficulty by one man. In operation it is comparatively inexpensive, for its gasoline consumption only amounts to about a gallon and a half for an all-night period.

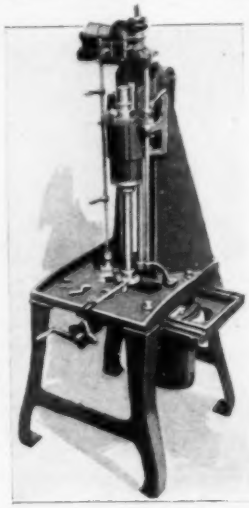
CAMP STOVE DERIVES HEAT FROM BLOWTORCH

By attaching an ordinary blowtorch to a boxlike oven surmounted with suitable grating, an inventor has devised a portable camp stove whose flame will not blow out in the wind and which produces a quick, intense heat. The flame is conducted from the torch through a flue terminating under the grating in two funnel-shaped outlets. Dampers are provided by which the amount of heat issuing from these vents can be regulated. A quart of gasoline will feed the stove for three hours, it is said. An additional advantage of the outfit is that it provides a blowtorch which is always available for repair work on the road.



NEW CYLINDER-GRINDING MACHINE FOR GARAGES

Well suited to the needs of the average garage is a cylinder-grinding machine which has recently been put on the market. It stands 6 ft. high, occupies small floor space, and does not require the services of an expert operator. The table and the upright arm carrying the movable spindle are one casting, a feature which promotes accuracy of alinement. Located on the front of the machine, within easy reach, are all the operating levers, including those controlling the up-and-down feed and the speed of the spindle. When desired, the latter can be adjusted to move eccentrically while revolving on its axis. The cylinder block to be ground is bolted to a sliding plate which travels on ways underneath the table and can be brought into position by means of simple gearing. An elongated hole in the table gives easy access to the bores.



¶After much expense of time and labor the Coast and Geodetic Survey has completed a revised chart of New York harbor. Something of the work involved in bringing the chart up to date is shown by the fact that in one year there were 253 items of change to be made, requiring 233 days for compilation and engraving.

SIMPLE GAMES AND OCCUPATIONS HELP INSANE

Moderate Forms of Open-Air Exercise, Even Such as the Boyish Game of Leapfrog, Are Highly Beneficial to Those Whose Mental Apparatus is Deranged. Importance is Attached to This Fact at the Philadelphia Municipal Hospital, Where These Pictures were Obtained

When the Mind Is Weak, Idleness Promotes Brooding. This Condition is Combated by Keeping the Patients Employed and in the Open Air as Much of the Time as Is Possible. When the Weather Is Unpleasant, Indoor Exercises and Tasks are Arranged. Above, the Men are Modeling Clay

Usually Women Are More Gentle and Patient than Men and Get Readier Response from Those Whose Mental Processes Fail to Function Normally. The Women Pictured Here are Explaining the Rules of a Game to a Group of the Inmates

Only Games and Tasks of the Simplest Possible Character are Indulged in at the Outset. Gradually, as Improvement Warrants, Slightly More Difficult Pastimes are Employed. If Interest Lags, a Change is Made in the Program. In This Way Progress is Attained and Persons Who have been Listless and Morbid for Years are Brightened and Strengthened. The Picture Above Shows Some of the Women Patients Engaged in Outdoor Exercise

COAL PILE SO HUGE THAT TRAINS CLIMB OVER IT

A coal pile so huge that the trains used to add to its size climb up over it

Partial View of a Railroad Company's Huge Coal Pile Surmounted by a Coal Train Which is Adding to the Mass

on temporary tracks, is to be found in a yard of a railroad which is making preparation against a possible coal famine. As the level of the coal rises, the tracks are lifted up in much the same manner as in ordinary track-elevation work.

BUGS LESSEN FOOD BILL AT FISH HATCHERY

A change recently instituted by the warden of a Kansas state fish hatchery would seem to indicate that the food-conservation movement has extended to the feeding of the fish in that institution. The change consists in installing electric lights above the fish ponds, with the result that large numbers of bugs and smaller insects are attracted to the vicinity at night. Eventually many of these fall into the water and are fed upon by the fish. In the past the cost of food for the finny creatures has been about $1,000 per year, but it is predicted that under the present arrangement this expense will be reduced.

FLOOD UPSETS HUNDREDS OF LUMBER PILES

A strange spectacle was presented when a flood occurred at St. Maries, Ida., recently which totally covered low land, utilized as a lumber yard, with 16 ft. of water. Piles aggregating 30,000,000 ft. of lumber were set topsy-turvy in a most fantastic fashion by the rise of the water. Timbers of all sizes were tossed into heaps that suggested games of giant jackstraws. When the water subsided, about 80 per cent of the piles righted themselves, and the owners of the yard were able to save considerably more than had been expected when the river began to rise to such an unusual height. Fortunately the current among the piles was slight.

The Dark Rectangular Patch in the Flooded Area is Composed of Floating Piles Aggregating 30,000,000 Feet of Lumber

A Close View of the Lumber Yard at St. Maries, Idaho, Set Topsy-Turvy by a Flood

Students in Training at an Officers' Reserve Camp Learning to Shoot on a Rifle Range: The Targets at Which They are Aiming Are 50 Yards Away

RANGE TARGETS AND HOW THEY ARE OPERATED

By E. F. INGALS, Jr.

FEW men, other than those who have had experience on an outdoor rifle range, know in what manner the targets are worked and scored so that the man on the firing line knows just what he is doing. An onlooker watching rifle practice on an outdoor range hears the crack of the rifle, he sees the target change, he sees certain disks or flags come up in front of the target and descend, and he hears the marksman remark, "a four at seven o'clock." What does it all mean? Only the initiated can tell.

The targets are mounted behind a large mound or ridge of earth which is about eight feet high, and are set perhaps five feet behind the ridge. This affords the target men ample room to walk in front of the targets and still be sheltered from the rifle fire. The targets, which are about six feet square, are mounted in pairs so that when one target is up above the protecting ridge or embankment, the other one is down behind it. As one target is pushed up into place, the other target drops down. The target that is used at 500 or 600 yards has a black circular area in its center measuring 20 in. in diameter. This is called the "bull," or the bull's-eye. Around this black center are two black circular lines, the first line having a diameter of about 40 in., and the second line having a diameter of about 60 in. These lines mark off the "four" and "three" rings respectively. If a shot lands in the black center, namely the bull, it adds five points to the marksman's score. If it strikes outside the bull, but still within the boundary marked off by the first line, it counts as four points. Outside of that, but still within the boundary of the second line, the shot counts three points. If the bullet strikes anywhere else on the target, it counts as two; and if it misses altogether, the score is zero.

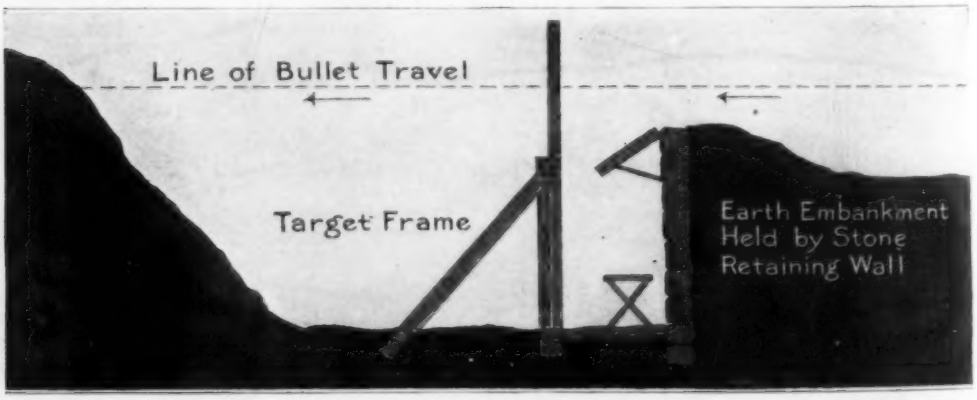
The handling and scoring, however, is the interesting part. Let us begin with the firing. After a shot is fired, the fresh target is raised into position while the other one is lowered. The target men examine the lowered target carefully until the bullet hole is located. Then the target is scored, and after the scoring the man on the firing line is at liberty to fire again. While he is firing his next shot, a small piece of paper about the size of a postage stamp is pasted over the bullet hole in the lowered target so that succeeding shots on that target can be identified. Squares of black paper are used over holes in the bull, while white squares are used over other holes in the target. If for any reason it is desired that firing should cease, a red flag is placed squarely in front of the exposed target, and until the flag is removed, no firing on that target is permissible.

Let us come back to the scoring of the targets. When the bullet hole is located in the bull's-eye, for example, a white metal disk, 10 or 15 inches in diameter, is raised to such a position as to indicate the location of the bullet hole on the target. If the bullet hole had been found in the "four zone" a red metal disk would have been raised in a similar manner. In scoring a shot counting three, a disk is used which shows a black cross on a white background. A black disk is used in scoring a "two" on the target. If the shot should miss the target altogether, a red flag is waved in front of the target to indicate a miss. Frequently, however, the bullet strikes the ground in front of the target and then glances upward as a flat stone might do when skipping on water. If, perchance, the bullet should strike the target in so doing, the score that it made would be counted as a regular hit. In marking, however, besides the regular scoring, a ricochet flag would be waved in front of the target at the same time. A ricochet bull would be scored by both the white disk and the ricochet flag. A ricochet miss is scored by waving both the red flag designating a miss and the ricochet flag. This flag is white with a red square in its center.

But back at the firing line we hear the marksmen speaking of "fours at three o'clock" and of "threes at nine-thirty." What are they referring to? It is like this: As you face the target, just imagine it as the face of a clock with imaginary figures indicating the hours in their respective places. Now a "four at three o'clock" would mean that the bullet had struck the target in the ring that scores four points, and had struck directly to the right of the bull, or over toward the imaginary figure three on our imaginary clockface. A "three at nine-thirty" means that the bullet landed in the three ring still farther from the bull, and had struck a little high of directly to the left, or halfway between our imaginary nine o'clock and ten o'clock. By this means the rifleman can always locate his shots accurately. Likewise, in speaking of the direction of the wind, one will hear it said that a "five-o'clock wind is blowing." In this case, however, our imaginary clockface is laid flat on the ground with the target as 12 o'clock and the marksman as six o'clock. On the whole this system makes a very good means of keeping a record not only of one's scores, but also of the wind conditions under which one has been shooting.

BIG APARTMENT BUILDING HAS JAPANESE ASPECT

The extremes to which architects can go in adapting Japanese and Chinese architectural features to American buildings are illustrated in the apartment house shown herewith. The exterior presents quite a bewildering array of low roofs, broad eaves, and



A Diagram Showing the Arrangement of the Range Targets: The Gallery in Which the Score Keepers are Located Is to the Right of the Target Frame

An Apartment House Decidedly Unconventional in Its External Aspect: In His Effort to Find Something Distinctive in Design the Architect has Provided a Type of Roof, Eaves, and Balconies That Suggests Japanese Architecture

overhanging balconies, so designed as to produce an oriental effect. The interior differs but little from that of other apartment houses.

WHEN POPULAR MECHANICS REACHES THE TRENCHES

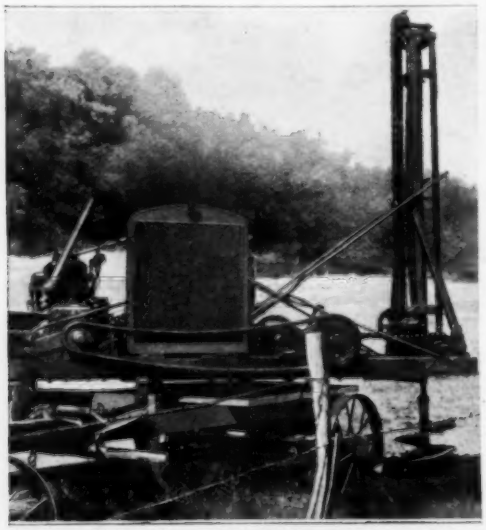
News from the outside world is as eagerly sought by the fellows at the front as are the cocoa and wafers that are served at Y. M. C. A. canteens in the trenches. Tasteful refreshments, something to smoke, and a good magazine or a letter from home; these are among the things that go far toward breaking the monotony of trench life and making the leisure hours of soldiers enjoyable. Perhaps this is best illustrated by a letter lately received from a lieutenant with the Canadian engineering corps in France, in which was inclosed the photograph reproduced herewith. Referring to Popular Mechanics Magazine he writes: "I can assure you it was with the greatest pleasure that we received the copy shown and got a bit of an idea of what was going on outside. You can get the expression of interest in my pal's face. Thinking you might be interested to know we are getting a copy of your world-wide publication in the thick of things, I am sending this [picture] along. . . ." All of which tends to

In the Trenches of France with a Magazine from Home

show that war is not so absorbing to those actually engaged that it stifles interest in normal civil activities.

POST-HOLE DIGGER DRIVEN BY OLD AUTO ENGINE

The ingenuity of a ranch owner has enabled him to construct a power-driven post-hole digger at comparatively little cost. The outfit is mounted on a ranch wagon and is driven by an engine taken from a wrecked automobile. A big auger is held in a vertical position at the end of the wagon and is connected with the engine by improvised chains and gearing. The digger can be moved quickly from point to point and will make a post hole in a short time.



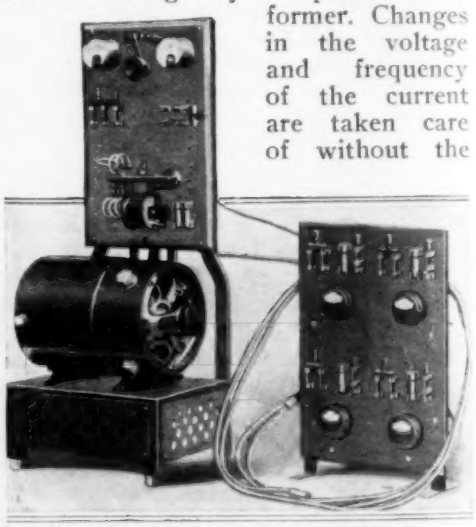
A Post-Hole Digger Driven by an Engine Taken from a Wrecked Automobile

WAR DEPARTMENT PERFECTS PLAN OF PAYING SOLDIERS

American soldiers are to be paid monthly in a way which will protect United States money from the danger of being captured or sunk by the enemy. A large credit has been established in France so that each disbursing officer can draw directly on the government. The plan is particularly convenient and advantageous for the boys at the front. A soldier will have the choice of being paid in French currency or by check on the treasury. Each month announcement will be made of the exchange rate at which payment will be made. If, for example, the rate were set at 5.70 and some subsequent economic development sent the exchange higher, the soldier would profit. On the other hand, if the exchange fell so that banks were willing to give 5.80 francs for each dollar, a soldier could obtain a check instead of accepting the paymaster's fixed rate. A fighter is thus offered the chance of winning by a change in the money market, but at all times is protected against loss.

SYNCHRONOUS MOTOR USED WITH SIMPLE RECTIFIER

Interesting construction is embodied in a new rectifier that has been developed particularly for transforming electric current from alternating to direct for motion-picture purposes. It is also employed for charging storage batteries. The important feature of the outfit is a synchronous motor that keeps a two-segment commutator revolving at the proper speed to reverse the current, which is reduced to the desired voltage by a special transformer. Changes in the voltage and frequency of the current are taken care of without the



This Rectifier, Which Operates with a Synchronous Motor, is Especially Intended for Motion-Picture Work and Storage-Battery Charging

use of auxiliary devices, and as a result high efficiency is claimed to be obtained. The apparatus can be installed without difficulty in any projection booth, for it requires only 10 by 14 in. of floor space.

THRILLING RACE DOWN DARK TUNNEL ENDS IN DEEP POOL

Reports have been received of a strange subterranean trolley accident that occurred some weeks ago in a railway tunnel under construction in New Zealand. The bore has about a three-per-cent down gradient. Shortly after a car carrying four men entered the tunnel, its acetylene headlight became extinguished. While engulfed in darkness, something else went wrong and control of the car was lost. Two of the men jumped, but before the others could follow, the trolley gained headway and thundered through the black passage at express-train speed, headed for a blank wall that terminated the excavation. By odd good fortune, it happened that the pumps were out of order and the lower end of the tunnel was filled with water. This acted as a buffer and the men were hurled into the pool.

FERTILIZER LOADER HAS TOOTHED BUCKETS

Steel buckets whose edges are fitted with rows of sharp teeth are a special feature of the loading machines used to handle hard acid phosphate in certain large fertilizer-storage plants. So hard does this substance become that drills are used to break it up, after which the machine elevates it to a hopper to be ground. Following this process it is discharged into wheelbarrows at the rate of a ton a minute, in some instances. A loader such as is shown in the illustration saves the work of six men.

Machine for Loading Acid Phosphate: The Fertilizer Is So Hard That Drills are Used to Break It Up. The Loader's Capacity Is a Ton a Minute

AN ESKIMO NAVY FOR COLD OCEAN PATROLS

By FITZHUGH GREEN

The Navy Department is spending more than $4,000,000 on winter clothing for its bluejackets. In the past our fleet has wintered among the West Indies, where the balmy average temperature of about 83° F. required only ordinary summer garb.

A percentage of each battleship's deck force will be provided with cold-weather apparel. Scouts and patrols will have at least half their men similarly equipped; destroyers, who will suffer most in the northern ice lanes above Scotland and Ireland, can draw full costumes throughout.

The following list of articles has been

published to the service: wind-proof shirt with hood; wind-proof trousers; blanket overshirt, wool, with a hood; four pairs each of heavy socks and mittens; one pair of high leather sea boots.

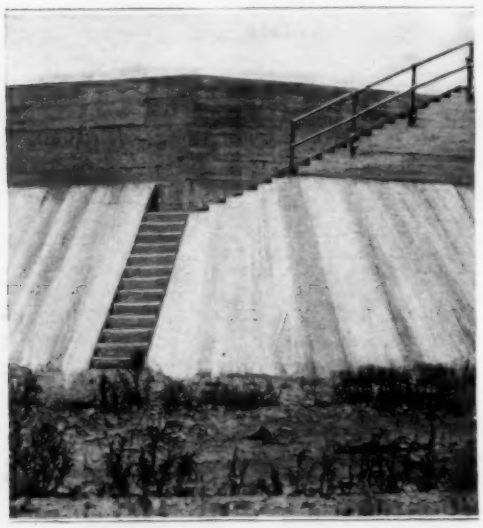
The wind-proof suit may well be noted by farmers and others who suffer so much from exposure through our cold western and northern winters. It is of light, close-woven material, such as high-grade duck or khaki. Sleeves and body are full to permit plenty of woolens underneath. The attached hood fits closely about the face and forehead, and can be closed by a drawstring. Tapes are also fitted at the waist and wrists.

The design is that of a North Greenland Eskimo's costume adapted to a sailorman's activity. Blanket shirts worn directly beneath the wind-proof are of an identical pattern, only slightly smaller. Common army or navy blankets will be used for economy's sake.

An Eskimo fortifies himself against the endless blizzards of the arctic regions by a thick padding of clothing which is always surmounted by some thin, light layer impervious to wind and snow alike. This idea forms the basis for the Navy Department's plans. The costume will be cheap and durable. Its lightness will be a great factor in a man's freedom of movement. What this means one can imagine who has seen an almost helpless fisherman weighted down by a vast bulk of poorly insulated clothing that hampers every movement he makes.

STEPS LEAD TO SHORT CUT ACROSS RIVER BOTTOM

In arid regions of the West and Southwest many rivers are not rivers



The Steps in This River Wall Enable Pedestrians to Cross the River Bed at This Point during the Dry Season Instead of Walking Several Blocks to a Bridge

at all nine or ten months of the year, but merely hard gravel-strewn bottoms. In such instances bridges are more of a nuisance than a convenience if they afford the only means of crossing these dry channels. This accounts for the fact that when a concrete wall was erected along one of the arroyos to confine the occasional floods that sweep through it, flights of steps were built into the barrier every few hundred feet for the convenience of those living in the neighborhood. During the months that the river is dry these stairs enable pedestrians to take short cuts across the river bottom and thus avoid walking several blocks to a bridge.

IRON AND STEEL PROTECTED BY PORE-FILLING OXIDE

Iron and steel are said to be permanently protected against rust by a process of treatment that is now being used commercially. The material is placed in an oven and heated to a temperature of 1050° F., while subjected to the action of certain gases. Dry steam is introduced and an oxide formed that penetrates the pores and covers the outer surface of the metal. After an hour in the oven, the material is removed and permitted to cool gradually. It is then submerged in heated paraffin oil, which neutralizes the chemical deposit and produces a permanent black finish, after which it is dried in sawdust.

WILL BETHLEHEM OBSERVE CHRISTMAS AS OF OLD?

FOR many years the Turks have grudgingly permitted Christians in Palestine to observe solemn rites in places Christendom holds sacred, notably in Bethlehem. Here a patriarch of the church can be seen entering that city in state on Christmas Eve. But this year the "City of David" is in the path of the on-coming British forces, and who can forecast what solemn or tragic scenes will take place in these streets on Christ's natal day?

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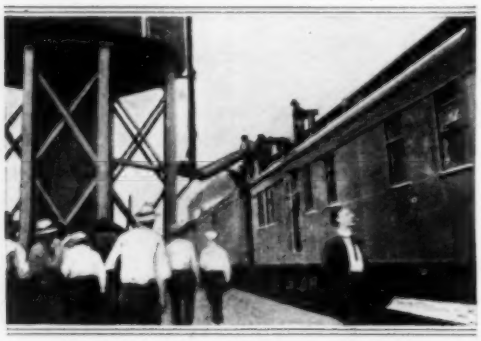
USE WATER FROM RAILROAD TANK TO FIGHT CAR FIRE

A fire, which had started in an express car attached to one of the trans-



Putting Out a Fire on the Roof of an Express Car in a Transcontinental Train with Water from a Railway Water Tank

continental trains, was recently extinguished by means of water from a railway water tank at Mobridge, S. D. The blaze was discovered in the roof of the car in time to prevent serious results, for instead of the engine backing for water, the train was pulled up sufficiently to utilize the big stream from the tank in putting out the flames.

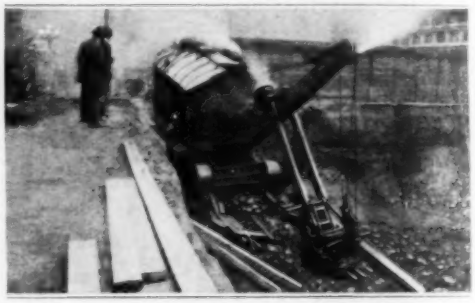
CLASS ERECTS MEMORIAL SHELTER FOR BELL

A beautiful and distinctive memorial has been erected on the Scott High School grounds in Toledo, Ohio, by the class of 1917 in the form of a shelter for a bell which is one of the school's prized relics. Formerly this bell hung in the Central High School building, serving as a school and fire signal from 1853 to 1895, when the structure was destroyed by flames. It was taken from the ruins badly cracked and now

has been installed in a carved-stone shelter having arched openings on four sides. The memorial cost $2,995 and in design is in harmony with the architecture of the school near which it stands.

STEAM EXCAVATOR KICKS ITSELF UP AN INCLINE

After a deep excavation had been completed with a self-propelled steam shovel it was found that the machine could not be driven up the steep embankment to the street level, even though its own power was supplemented by that of two motor trucks. The difficulty was finally overcome by repeatedly driving the bucket into the ground at the lower end of the machine

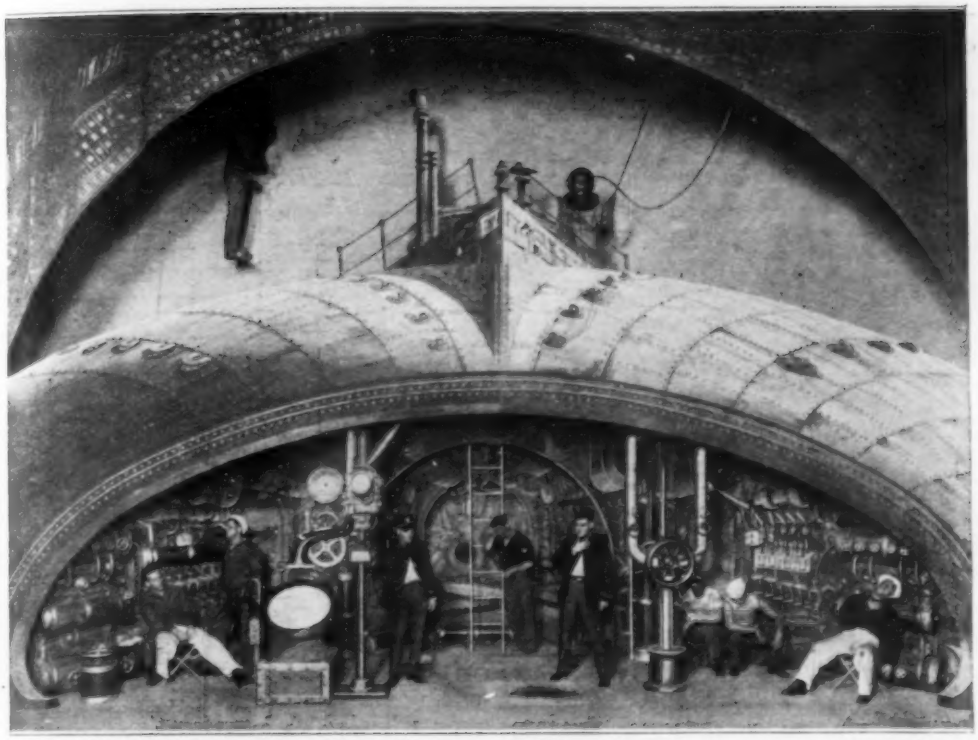


Steam Shovel Pushing Itself Out of an Excavation: The Jets of Escaping Steam Show That the Machine is Prepared for Maximum Effort

and, by a series of short pushes or kicks, forcing the excavator up the incline foot by foot.

INTERIOR OF SUBMARINE VIVIDLY PORTRAYED

In spite of the peculiar difficulties involved, the interior of a submarine has been made the scene of a play that portrays undersea warfare with remarkable realism. The stage is occupied with what appears to be a cross section of a submarine that is searching for the German fleet. The craft's varying depth below the surface is indicated on a large dial in full view of the audience. When the order is given to turn on the periscope, what appears to be a reflected periscopic view of the



A Stage Setting Showing the Interior and Exterior of a Submarine: This Scene Represents the Moment When the Boat is Supposed to be Sinking and the Crew has Collapsed. Earlier in the Play What Purports to be a Reflected Periscopic View of the Sea's Surface is Thrown on the White Disk at the Left by Means of a Motion-Picture Projector

ocean's surface is shown on a large frosted glass plate beneath the end of the periscope tube. The changing scene is in natural colors and is produced by a large motion-picture projector located beneath the glass. The climax of the play comes when the enemy's fleet, clearly shown on the glass, fires on the submarine and, as indicated by the dial, the underwater craft sinks lower and lower. Members of the crew are overcome and collapse at their posts. At that instant, divers descend from a friendly vessel to the sinking boat, saving the vessel and its crew as well.

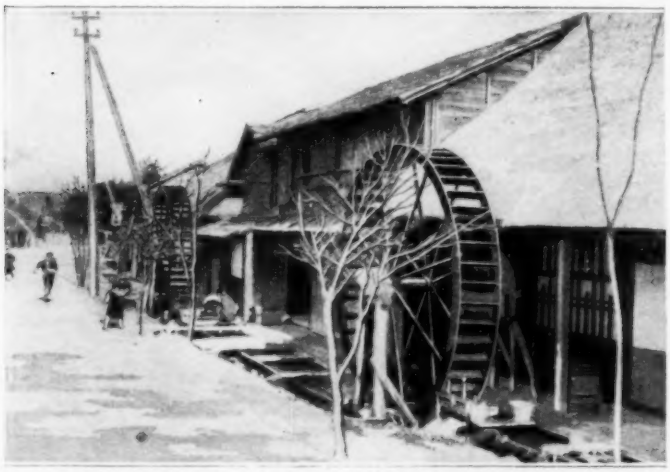
SUNKEN BOAT AND CARGO DOUBLE IN VALUE

The recent salvaging of a steel ship of 4,764 gross tons which sank in Georgian Bay, Ontario, in the latter part of 1915, furnishes striking evidence of the remarkable rise in the values of vessels which has taken place since that date. When the vessel went down it was carrying a hull insurance of more than $200,000 and was valued at between $350,000 and $400,000. The persistence of a wrecking company in the face of unusual difficulties finally brought the vessel to the surface, and when it has been repaired it will be worth $750,000 or more, according to estimates.

WATER WHEELS IN JAPAN USED TO POUND RICE

In spite of the rapid advance in mechanical lines which Japan is making, much primitive machinery is still found in that country. The accompanying street scene was photographed in a mountain village in the island empire and shows some of the big water

wheels, driven by a stream, which operate wooden pestles for pounding rice.



Street Scene in Japanese Mountain Village Showing Two of 27 Water Wheels on This Thoroughfare Employed in Pounding Rice

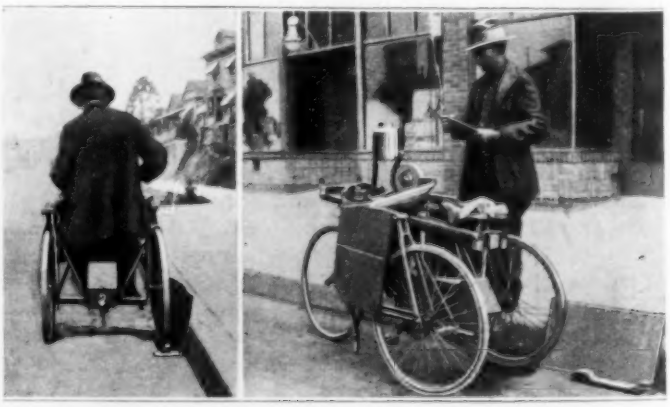
There are 27 of these picturesque, but crude, wheels on this one street.

SAUSAGES AND CAKES MADE WITH COTTONSEED FLOUR

A new food product which vegetarians may well claim represents a partial victory for the meatless diet is the cottonseed sausage, made somewhat after the manner of peanut sausages that are now supplied to German troops. The new product is not all or chiefly vegetable, however, since it contains three parts sausage meat to one part cottonseed flour. Because of the low cost of the latter it is claimed that the new sausage is eight cents per pound cheaper than the usual kind. Special effort is now being made to show the public the food value of cottonseed flour, emphasis being placed on the fact that its protein content is much in excess of that of meat. This flour has been used with success in making bread and cake and at a recent luncheon for men interested in the cottonseed business, ginger snaps and jumbles made from this flour were served and much enjoyed.

SCISSORS GRINDER'S ODD HOMEMADE OUTFIT

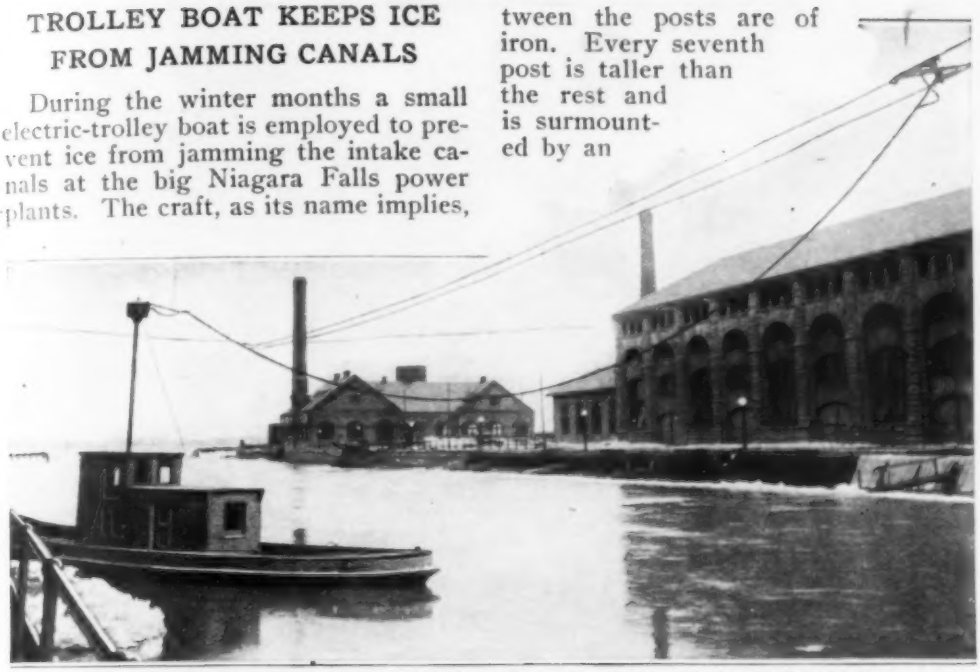
An itinerant scissors grinder has constructed a very serviceable outfit for himself by combining parts of two bicycles into a three-wheeled conveyance which he pushes along the street. The grindstone is mounted just back of the front wheel and is driven with pedals and a chain, the operator sitting on a seat just above the two rear wheels. A box for the grinder's tools is mounted above the rear axle, while a frame for holding saws to be filed is attached to the front end of the frame. No means is provided for propelling the tricycle by foot power, though a few alterations would make that possible. Included in the outfit is a hollowed block which is placed on one wheel to keep the machine steady while grinding is being done.



Two Views of a Homemade Grinding Outfit Constructed from Bicycle Parts: Pedals are Used to Drive the Grindstone but are Not Employed to Propel the Conveyance

TROLLEY BOAT KEEPS ICE FROM JAMMING CANALS

During the winter months a small electric-trolley boat is employed to prevent ice from jamming the intake canals at the big Niagara Falls power plants. The craft, as its name implies, is quite an unusual one and is driven by a 75-hp. motor which receives current from a pair of overhead conductor wires strung above the water. At the top of a short mast there is a swivel arrangement through which connection is made with the insulated cables extending to the double trolley that travels along the transmission wires. This enables the vessel to move freely without continually tangling the feeders while it is engaged in attacking big cakes of ice and sending them on their way downstream.



The Little Steel Boat, Driven by an Electric Motor, Breaks into the Ice Packs and Keeps the Intake Canals Open during Winter Months

ARTISTIC PRISON FENCE SERVES TWO PURPOSES

In place of forbidding walls and gratings which unhappily mark the boundaries of many penal institutions' grounds, the prisoners' ward of a county hospital in the West has been surrounded with an artistic fence in which light standards have been incorporated. The posts are of concrete while the portions of the barrier between the posts are of iron. Every seventh post is taller than the rest and is surmounted by an electric-light globe so that the whole fence is well illuminated at night-time.

This Artistic Fence around a Prisoners' Inclosure Is in Pleasing Contrast to Many Prison Barriers. Every Seventh Post Serves also as an Electric-Light Standard

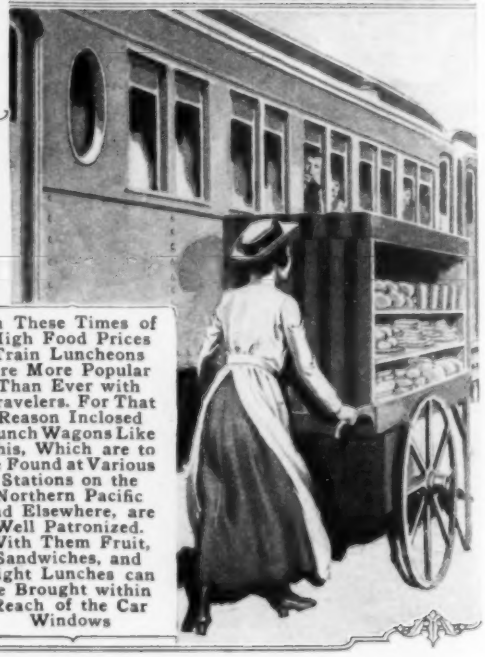
CIVIC FEATURES THAT PROMOTE THE COMFORT

For the Convenience of Bathers and Others This Clock has been Installed at the End of a Promenade at Coronado, California. It Hangs beneath a Pleasing Gabled Shelter Several Feet above the Rail and Bears the Advertisement of an Enterprising Jeweler

By Making Direct Connection with One of the Outlets of a Fire Hydrant This Convenient Drinking Fountain has been Installed in Galion, Ohio, at Slight Expense. The Overflow Leads to a Sewer Below

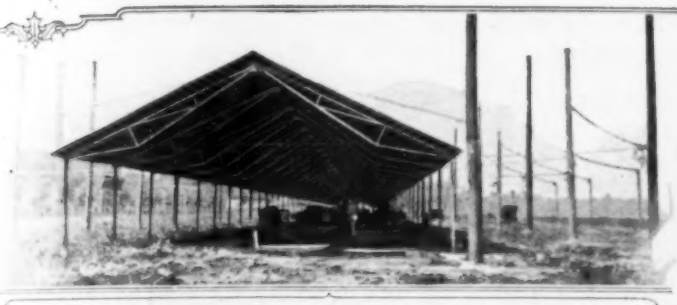
This Floating Band Stand with a Thatched Roof of Palm Leaves Is a Special Attraction in a Los Angeles Park. It is Often Occupied by a String Orchestra and on These Occasions Pleasure Seekers Are More Ready to Rent Boats That They may Row Out and Hear the Music Better. Thus the Owner of the Stand and Boats Increases His Revenue Materially

Every Student at the State University of Iowa, at Iowa City, Knows This Bench. The Fine View Obtainable from This Spot Is Suggestive of a Favorite School Song Which Appears on the Bronze Tablet on the Back of the Seat



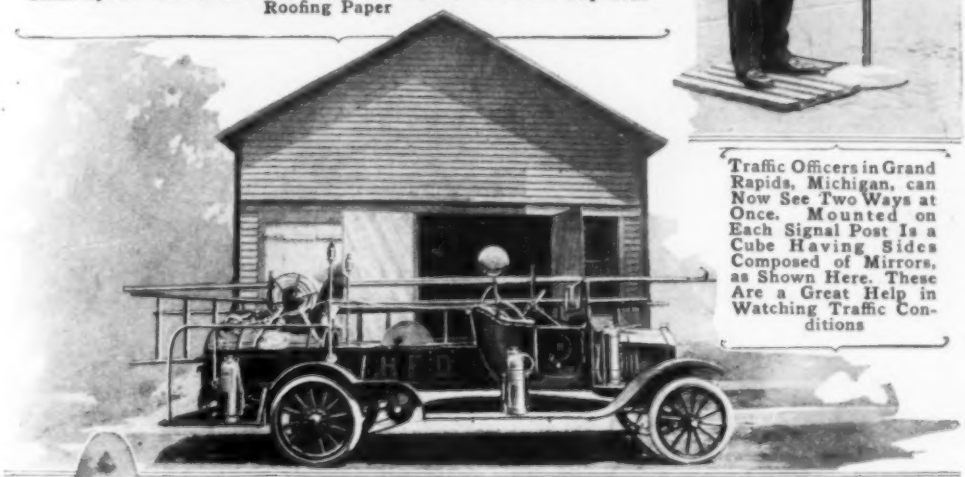
In These Times of High Food Prices Train Luncheons Are More Popular Than Ever with Travelers. For That Reason Inclosed Lunch Wagons Like This, Which are to be Found at Various Stations on the Northern Pacific and Elsewhere, are Well Patronized. With Them Fruit, Sandwiches, and Light Lunches can be Brought within Reach of the Car Windows

AND ENJOYMENT OF RESIDENTS AND VISITORS



For Several Seasons the Chamber of Industry at Cleveland, Ohio, has Held Its Displays in Tents, but This Year It Secured This More Substantial Structure, Consisting of a Steel Frame Composed of Numbered Parts That can be Fitted Together Quickly or Packed into Small Space. The Sides are Covered with Canvas and the Top with Roofing Paper

Traffic Officers in Grand Rapids, Michigan, can Now See Two Ways at Once. Mounted on Each Signal Post Is a Cube Having Sides Composed of Mirrors, as Shown Here. These Are a Great Help in Watching Traffic Conditions



At Hollansburg, Ohio, the Motor Car has Brought Better Fire Protection to the Countryside as Well as to the Town. This Village Secured the Coöperation of Farmers within a Three-Mile Radius in Purchasing This Fire Truck, Equipped with Chemicals, Ladders, and Tools. Now, in Case of Fire, It Speedily Responds to Their Phone Calls

The White Club Which This Vancouver, British Columbia, Policeman Carries Is Not a Mere Novelty, but Is of Decided Assistance in Indicating the Direction Traffic may Travel. A Stick of This Color, It has been Found, is More Easily Seen by Drivers Than One of a Darker Hue

Though Unable to Raise Their Salaries, Pueblo, Colorado, Helped Its Policemen Meet the Mounting Cost of Living by Granting Them "Free Water" for Irrigating Their Gardens, While a Corporation Loaned the Men 10 Acres of Land. How Well the Force Utilized These Novel Substitutes for More Pay, is Shown Here

REVOLVING CYLINDERS ARE FEATURE OF WINDMILL

A novel type of windmill has been invented which consists of a cylindrical metal housing, mounted on a tower and having two openings opposite each other. The housing contains two cylinders set vertically and fitted with wind vanes which cause the cylinders to revolve, one to the right and one to the left. By means of gearing they operate a perpendicular shaft which may be connected with a pump or machinery. The front opening of the housing is kept to the windward by means of a tail which swings the mill on its axis. Power is shut off by setting the tail at right angles to its normal position. In a storm, automatic governors perform the same function, so that a rounded section of the housing faces the wind.

Powerful Windmill with Two Revolving Cylinders

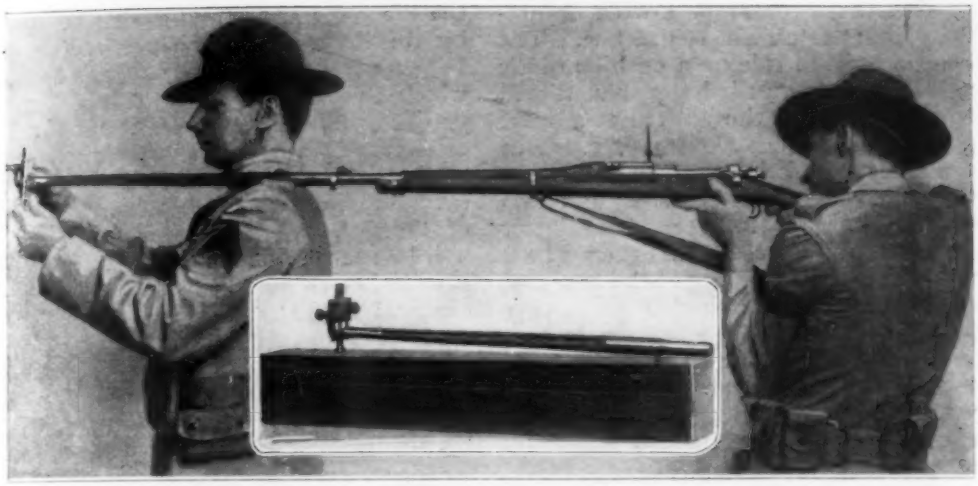
URGENT NEEDS IN FRANCE MET BY OUR RED CROSS

The war council of the American Red Cross, since its appointment last May, has appropriated more than $12,000,000 for work in Europe, of which over $10,000,000 has been spent in France. How splendidly this body, acting in behalf of the American people, is meeting the great task confronting it is shown in a recent report. While the main object of the organization is to care for our army and navy, it has found time and means to render valuable aid to our allies on the continent, particularly the French and Belgians. A wonderful work has been done in caring for and educating destitute children, and in caring for sick and wounded soldiers. While it is not the policy of the Red Cross to rebuild the villages of France, many of the population have been given shelter until they could return to their homes, and large numbers in the devastated areas have been aided with food, clothing, and agricultural implements.

It is estimated that some 500,000 persons in France have contracted tuberculosis as a direct result of the war. Our Red Cross has done valiant work in fighting this disease, not merely for the sake of France, but to obtain better health conditions for our own soldiers. The sum of $1,000,000 has been appropriated for the relief of sick and wounded French soldiers and their families. More than a dozen base hospitals organized by the American Red Cross are now doing active service in France and others are rapidly being made ready for foreign duty.

NEW LENS PREVENTS GLARE, FITS ANY AUTO LAMP

A new lens designed to eliminate the glare of automobile lamps, is so constructed that it can be easily attached to a headlight on any car. It is cup-shaped and encircles the bulb so that all light striking the reflectors first passes through the lens. The inner surface is ribbed and the outer surface covered with rounded elevations, the purpose being to produce a broad beam of strong, but diffused, light.



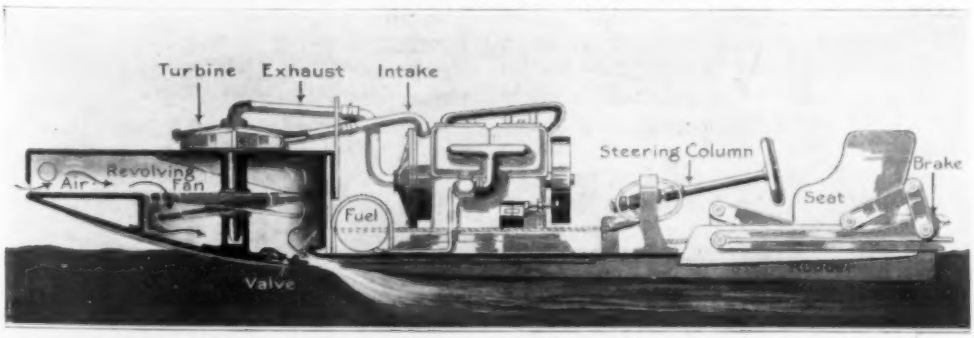
An Instructor is Here Shown Adjusting the Miniature Target on an Aiming Device According to the Pupil's Directions. On Word from the Pupil the Officer Registers the Aim with a Dotter. A Close View of the Attachment is Given in the Insert

DEVICE TEACHES AIMING WITHOUT USE OF SHOT

A new device with which instruction in aiming a rifle can be given, without the use of ammunition, has recently been tried out in teaching recruits the use of firearms. It consists essentially of a wooden rod, 16 in. long, with a metal end which is slipped on and fastened to the muzzle of the rifle. The outer end carries an arrangement in which miniature celluloid targets are placed. There are also screws for moving the target up or down and to the right or left. On this end, too, is a small dotting apparatus and a place for cards to be dotted by it. In learning to aim, the pupil rests his rifle on the instructor's shoulder and directs the latter to move the target as he, the pupil, deems to accord with proper aim. When the man aiming believes that the sights and bull's-eye are in proper alinement he calls out "mark," and the instructor, by means of a finger key, actuates the dotter. The latter makes a mark on the card which serves as a record of the aim.

CRAFT OF SHALLOW DRAFT DRIVEN BY AIR COLUMN

Radical features are embodied in a hydroplane that has been designed particularly for the navigation of shallow streams. Outstanding among them is the means of propulsion, a pneumatic



New Boat for Shallow Water Designed to Ride on Air and be Propelled by Air Pressure Instead of a Screw

system that represents a wide departure from established practice. The boat is built to ride on a cushion of air and to be propelled by air forced through ports in the bottom at a point slightly in advance of the motor, where the chief load is borne. The engine is connected with a centrifugal pump that operates a turbine. The latter drives a propeller which draws in air through a large opening at the bow and discharges it through the previously mentioned ports. The bottom is convex, while the knife-edge sides taper toward the stern, where they slant inwardly until nearly flush with the rest of the hull. This arrangement prevents the air column from escaping, except by traveling the length of the vessel. While doing so it forms a cushion on which the hydroplane rides. It is apparent that head resistance is cut to the minimum by the air intake at the bow, while friction is reduced by causing the craft to glide over the water instead of through it. The arrangement, as will be seen, provides only for forward propulsion and because of that, a mechanical brake is required. There is an interesting problem in determining whether the loss of energy through power transmission in this case is offset by the reduction in friction attained by pneumatic propulsion.

FRANCE COMPILES A "BOOK OF REPRISALS"

German "frightfulness" is being turned less and less, nowadays, against France. The Teutons have found that it does not pay.

The reason for the comparative immunity which France now enjoys—so far as shelled hospitals, ambulance trains, cathedrals, and peaceful villages are concerned—is to be found in a system of impartial retribution which our Gallic allies adopted approximately one year ago, and which they have pursued unceasingly ever since. Now even Bavarian denseness has grasped the idea.

Driven by the fact that the Germans always have been distinguished for uncivilized acts like suddenly dropping five 60-mm. (about 2½-in.) shells into a Red Cross hospital, a village green outside the real fire zone, or into an edifice like Rheims cathedral—that even a Vandal would have respected—the French quietly have printed a little book, the like of which probably never existed before.

This volume lists all the possible German atrocities—at least it lists all that the Germans have thought of to date—and then in opposite columns, it tersely recommends the reprisal that should be made.

At first, the idea was simply to discourage these atrocities, so when a Teuton battery dropped five 60-mm. shells at once in a Red Cross hospital, a French battery immediately replied with 12 shells of the same or larger caliber. The French did not exactly adopt the "eye for an eye" method, since even in revenge they could not descend to wanton cruelty. They placed their shells just as near to the German battery which had committed the outrage, as was humanly possible—the idea being to wipe out the malefactors as an instant lesson to their comrades in arms.

Three months of this, with the French batteries methodically dealing out reprisals, each on the basis of two to one, and a growing reluctance became visible on the German side. It is discouraging to the worst bad man to find that the chap he is trying to dishearten is handing back just twice as much as he receives. And the Germans found themselves exactly in this position, for the French were always ready, willing, and able to retaliate.

¶The rapidity with which fighting armies destroy each other's signal equipment is shown by the fact that the signal officer on General Pershing's staff has recommended that provision be made for $1,000,000 worth of wire alone, for each month of service.

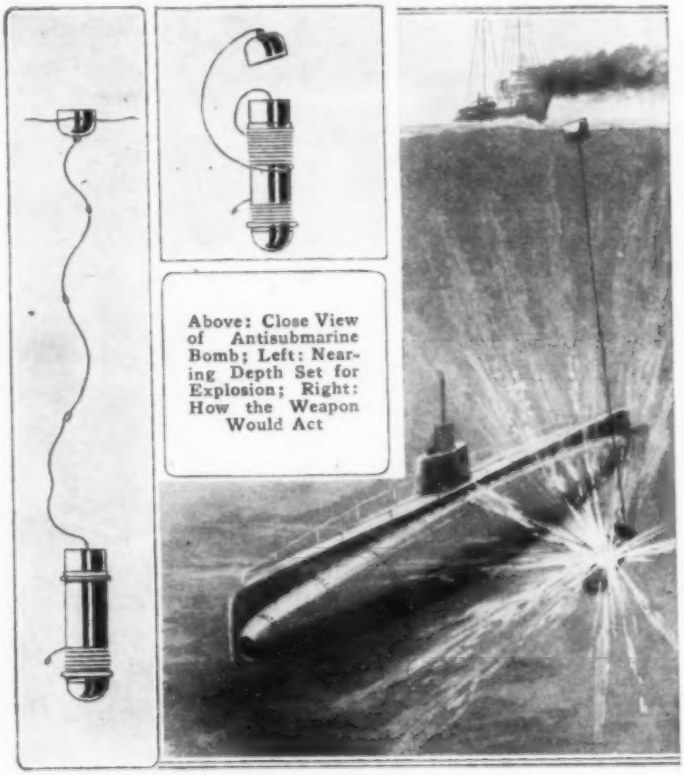
WOMEN STUDY MASSAGE TO AID THE MAIMED

An important lesson which this country can learn from Canada and our allies in Europe is that the masseuse can be of great service in working cures among the wounded soldiers, supplementing in an important way the work of the surgeon. Early in the present year the Canadian government, seeing the excellent results obtained along this line in hospitals at the front, opened an institution in Toronto for instruction in massage and remedial gymnastics. Women from all over the Dominion volunteered for the course. Those who enter are paid $25 per month during the six months' period of instruction, and the government reserves the right to reject any student at the end of the first month. On completing the course the salary is $75 per month and the graduate is subject to military orders. Refinement, tact, a good physique, and a fair education are required of those entering the work. With their treatment, which supplies a need not filled by the work of surgeons, these trained young women are able to restore the use of hands and feet, and even to restore the faculty of speech to many of the men.

¶The Post Office Department has announced that it is not permissible to add the words "Compliments of," together with a blank for the name and address of the sender, to the imprint which states that a magazine can be sent unwrapped and unaddressed to our soldiers.

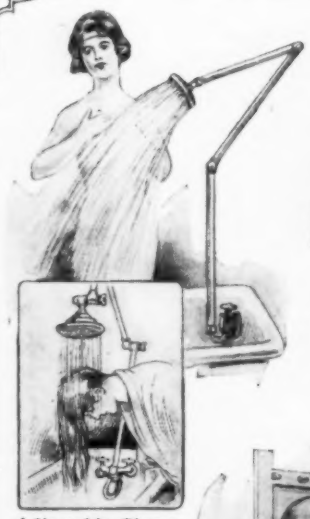
ANTISUBMARINE BOMB MADE TO EXPLODE AT ANY DEPTH

As one method of dealing summarily with Germany's U-boats, an American inventor has proposed to use bombs of a special type designed to explode at any desired depth when thrown into the sea. The missiles would be dropped from air craft or submarine chasers when an enemy boat was sighted beneath the water or seen to submerge. The bomb is connected by a light cable to a buoyant chamber that floats on the surface. As it sinks, the line, which is wrapped around it, unreels until a predetermined depth is reached. The jerk that then occurs actuates the detonator and discharges the explosive. When submerged at any considerable depth, a submarine is under an enormous pressure. An explosion, such as that of a high-power bomb, occurring in close proximity to it would cause it to collapse.



Above: Close View of Antisubmarine Bomb; Left: Nearing Depth Set for Explosion; Right: How the Weapon Would Act

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

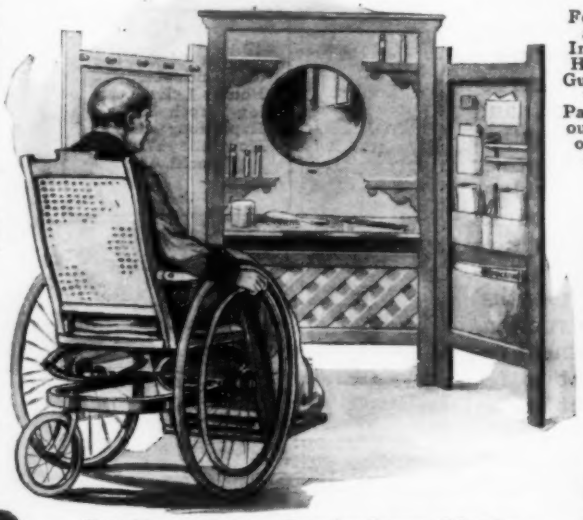


Adjustable Shower Attachment Requiring No Curtain, and Adaptable to Persons of Different Heights: Convenient, Also, for Rinsing Hair after a Shampoo, as the Inset Shows. Price $10

Unsealing Tin Can without Injuring It so That Subsequent Use Is Possible: Ring, When Heated, Melts Solder Permitting Cap to be Lifted after being Punctured. Price about 50 Cents

For Blind Persons and Those with Impaired Sight, a Head-Conforming Guide That Enables the Hair to be Parted Neatly without the Assistance of an Attendant. Price 25 Cents

Soft-Rubber Guard for Nursing Bottle That Affords Good Protection against Breakage

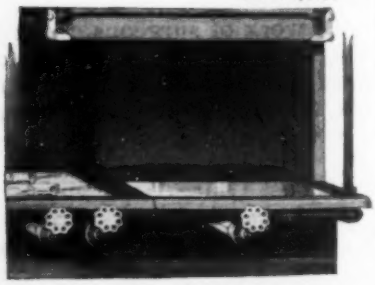


Portable and Folding Dressing Screen of Service in Homes Where There Are Invalids: It may be Placed beside a Bed, or Carried from One Floor to Another as Needed

A Gift Suggestion for Those Who Knit: A Silver-plated Yarn Holder of Attractive Appearance and Serviceable Form. Price $3.50

Between the Metal Base and Asbestos Top of This Flat-iron Mat Is a Layer of Waxed Felt That Keeps an Iron in Good Condition

Artistic Aquarium of Plain Glass Supported on a Substantial Wrought-Iron Stand. Price $7.50



Gas Range with Built-In Hot Plate or Griddle: The Ovens Are Immediately Above and the Open Burners at the Left

INTENDED FOR THE HOME AND ITS MEMBERS

Individual, Ribbon-Tied, Tapered Boxes Offer a Pleasing, Tasteful Way of Serving Cake. All Colors, $5

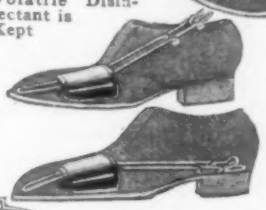
Rubber Washbasin Intended for Motorists and Campers: Hot Water does Not Injure It and When Not in Use It may be Folded Compactly

Leather Pouch with Two Openings, the Smaller of Which Permits Tobacco to be Poured into the Bowl of a Pipe without Needless Waste. Price 50 Cents

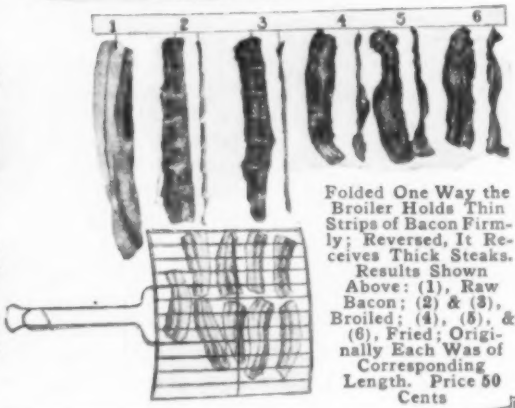
Among the New Accessories for the Sewing Room Is This Mahogany-Finished Lamp Equipped with Hooks and Pegs for Scissors, Needle Cushions, Thread, and Other Articles

Especially Suited for a Newel Is This Striking Lamp Made of a Three-Inch Shrapnel Case. An Opalescent, Projectile-Shaped Globe is Used. Price $10

Sanitary Toothbrush Holder: Glass Tubes with Ventilating Holes at Top Are Open at the Bottom and Mounted on a Revolving Base, Inside of Which a Volatile Disinfectant is Kept



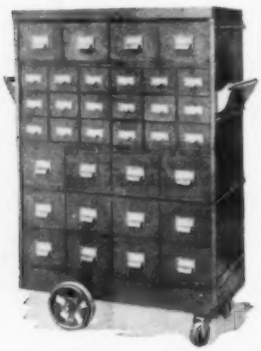
All-Metal Shoe Tree of Light Weight That Folds Compactly and Occupies Little Space in a Traveling Bag. Price 50 Cents



Folded One Way the Broiler Holds Thin Strips of Bacon Firmly; Reversed, It Receives Thick Steaks. Results Shown Above: (1), Raw Bacon; (2) & (3), Broiled; (4), (5), & (6), Fried; Originally Each Was of Corresponding Length. Price 50 Cents

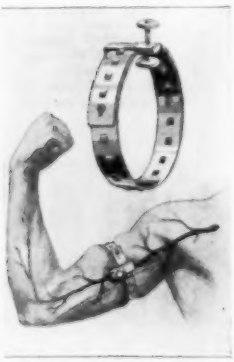
PORTABLE STEEL CABINET FOR VALUABLE FILES

The steel case shown in the accompanying illustration was made for an electric-light company which desired a container for its meter-record cards that would be fireproof. The case is of such a design that it would be serviceable in any office having similar card files. It contains sixteen 5 by 8-in. drawers, and eighteen 3 by 5-in., and stands 41 in. high. It is mounted on two heavy rubber-tired wheels and two swiveled casters, while at either end are handles so that it can be easily moved to and from the safe daily.



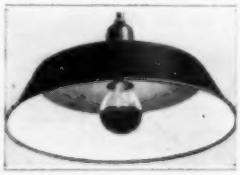
STEEL TOURNIQUET DEVISED FOR SURGICAL USES

Intended for war and ordinary emergency purposes as well as for the use of the surgeon when performing certain operations, a tourniquet has been devised that may be applied to the neck as well as to other parts of the body. It consists of a steel band that may be fastened about an arm or lower limb somewhat in the manner of a handcuff. Attached is a thumbscrew with a plug swiveled to its inner end. When this is pressed firmly against an artery, it controls the flow of blood without affecting the venal system unless the band is tightened for such a purpose, according to the inventor's claims.



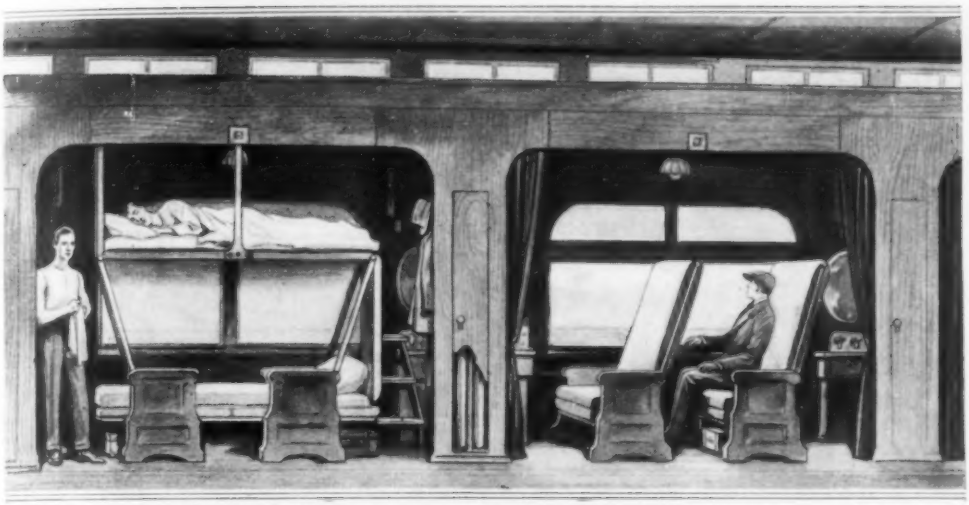
REFLECTOR GIVES BRIGHT LIGHT WITHOUT GLARE

The shape and construction of a new electric-lamp reflector are such that a strong light is produced, unaccompanied by a glare or sharp shadows, thus making it a desirable fixture for industrial illumination. This reflector is designed for use only with clear bulbs having the light filament concentrated in a small coil at the end. Over the end of the bulb is placed a metal cap silvered and polished on the inside. This throws a large part of the rays back into a porcelain reflector which roughly resembles an inverted pan, 20 in. in diameter, with wide-spreading sides. What corresponds to the bottom of the pan has a special concave shape which redirects the rays reflected to it by the cap, to the sides of the reflector, whence they are thrown into the room. The diffusion thus produced without dimming the light is what gives the reflector its distinctive character.



TEMPERATURE REGULATOR FOR AUTO ENGINES

A new model of a temperature regulator for the cooling medium of automobile engines is installed in the bottom water line of the radiator system, instead of the top line. It contains a corrugated-metal vessel containing a volatile liquid. When heated, this liquid is converted into vapor, and the metal vessel expands or contracts according to the temperature of the liquid, which is affected by that of the water in the cooling system as it passes through. By means of valves the regulator allows just enough circulation to keep the temperature of the cooling medium constant.



A View Showing Two Sections of a Proposed Design for a Sleeping Car: The Arrangement of the Berths Which are Entered from Their Respective Dressing Rooms at Either End, is Shown at the Left. A Section as It Appears for Day Service is Pictured at the Right

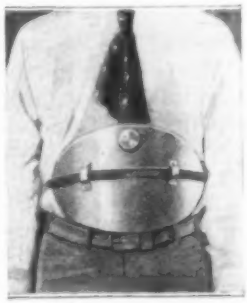
NEW SLEEPER ELIMINATES FAMILIAR DISCOMFORTS

A recent invention, designed to eliminate the various inconveniences occasioned by the present type of sleeping car, provides for a sleeper with 24, instead of 32 berths, each of which is entered with ease from the end rather than from the aisle, thus affording greater privacy. In this car an upper and a lower berth constitute a section divided from the adjoining ones by a partition and a narrow closet for holding the bedding in the daytime and the traveler's belongings at night. At the end of each section is a narrow dressing room furnished with a washstand, mirror, rack, etc., one for the upper berth and the other for the lower. In the former a set of steps is provided for the convenience of the occupant. The seats are made with high backs and can be faced either way for day service so that no passenger need ride backward.

To make up the berths the two seats are placed facing each other, the frames of the backs serving as a support for the upper berth. Each back, as well as each seat bottom, is composed of two upholstered parts that fold together. The backs are so hinged to the frame that they can be used as end partitions and as a base on which the upper mattress rests, while the two seat bottoms are opened up to serve as a support for the lower-berth mattress. The inventor has reduced the amount of weight carried near the roof of the car, thereby tending to lessen the swaying of the coach.

METAL HOT-WATER BOTTLE IS FORM-FITTING

For hospital and household use a metal hot-water bottle, curved to conform to the abdomen and chest, has lately been introduced. It is made entirely of aluminum and is supplied with loops that accommodate a belt by which the device may be strapped and held firmly in place regardless of the posture assumed by a patient. The capped opening is an inch and a half in diameter and permits the receptacle to be filled either with hot water or crushed ice.



PLATES REVEAL POSITION OF ADVANCING TROOPS

It is quite certain that the world will not know until the war is over, if even then, how many lives have been sacri-

Charging Soldiers Wearing "Back Plates" of Shining Metal Which Reveal the Position of the Men to the Gunners at the Rear

ficed because artillerymen have failed to keep their curtains of fire ahead of advancing infantry comrades. When telephone lines and aeroplanes fail, such tragedies are possible because the dull-colored uniforms of the charging soldiers are easily lost sight of when blended into the landscape. To prevent losses of this sort British infantrymen are now being equipped with "back shields" when they engage in a charge. These are merely shining oval disks of metal that are attached to the knapsacks.

The light that they flash back enables the gunners at the rear to follow the men's advance more closely and to regulate the artillery fire accordingly.

¶Castor oil, much used to lubricate aeroplanes because it is little affected by heat and cold, has doubled in price, so the government is to raise its own castor beans from which to extract the oil.

FAST PLANES LOCK HORNS IN AIR AND KILL PILOTS

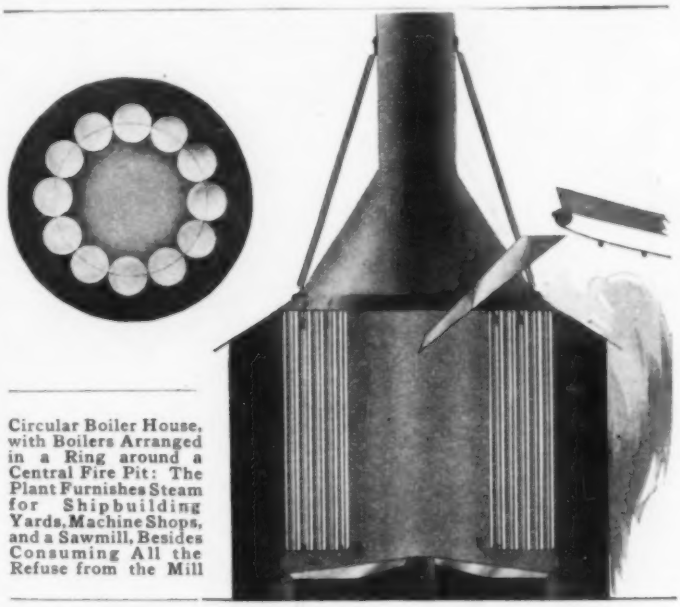
Two student airmen met instantaneous death at the North Island army aviation field, San Diego, when their machines, traveling at a high rate of speed, met in a head-on collision a few weeks ago. The accident was one of the most spectacular aeroplane wrecks that has occurred since our entrance into the world war. While flying at a blind angle, which prevented the pilots from seeing each other, the craft struck at an elevation of about 1,200 ft. The tremendous impact locked the engines of the two tractor biplanes so rigidly that they failed to separate when, far below, they landed on sun-baked adobe that was nearly as hard as concrete. Both fuel tanks exploded, shattering the machines and hurling the débris in a shower of fire. One airman was climbing for altitude and proceeding eastward. As he emerged from a cloud bank, according to one version, the other pilot, traveling toward the west, turned the nose of his craft downward, preparatory for descent. The collision followed instantly. Although the airmen had the entire field to themselves, the tragedy was purely accidental, but scarcely unavoidable. Fortunately it was one of a character that is exceedingly rare.

CEMENT BLOCK RESEMBLES THIRTEEN BRICK

A very serviceable design for cement building blocks is shown in the accompanying illustration of a unit which is fashioned to resemble 13 brick laid in four tiers, the ends of adjacent blocks being such that they dovetail into each other. Blocks of this sort are particularly suited for covering frame houses with a veneer. The resemblance of these cement units to brick can be made nearly perfect by facing them with suitably colored material.

BOILER HOUSE CONSUMES SAWMILL REFUSE

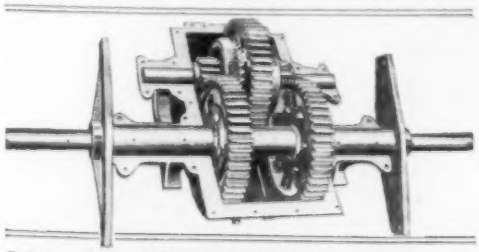
The boiler house of a shipbuilding plant at Seattle is a circular steel structure, in which the 12 drum boilers, each 30 in. in diameter, are arranged on end in a steel framework around a central fire pit. Besides extensive machine shops and shipyards, the plant includes a large sawmill, and the boiler house also serves as a consumer of all the refuse from this mill, which is picked up by traveling conveyors and finally dumped into the consumer through a chute passing over the ring of boilers to the fire pit. The inside of the boilers and the through tubes come in contact with the fire and burning gases, while the outside is lagged with asbestos covered with canvas. The boiler house furnishes steam for generating the electricity used in the plant, power for the sawmill, and power for air and hydraulic compressors. When the fire is once started beneath the boilers, it is said practically to take care of itself by the consumption of the sawmill refuse continually dumped in from the conveyor above. The arrangement, it is claimed, solves the refuse problem which is a matter of concern in sawmills handling large quantities of timber.



Circular Boiler House, with Boilers Arranged in a Ring around a Central Fire Pit: The Plant Furnishes Steam for Shipbuilding Yards, Machine Shops, and a Sawmill, Besides Consuming All the Refuse from the Mill

GEARS ON NEW TRACTOR ALL RUN IN OIL

By designing a tractor all gears of which are inclosed in oil, a concern has provided a farm machine whose transmission cannot become clogged and worn by dirt as is common with many tractors. The improvement makes the engine 25 per cent more efficient, it is claimed. In this transmission a conventional train of gearing carries the power to an ordinary differential. In delivering the power from this point on, special features are introduced. The differential actuates two identical sets of gears, one for each drivewheel. Each set terminates in a cogged wheel mounted free on the rear axle but rigidly connected with one drivewheel by means of a sleeve placed about the axle. The case inclosing the gearing, which by this arrangement is confined in quite small space, is partly filled with oil that needs replenishing infrequently. All bearings have dust-tight casings.



Driving Gear of New Farm Tractor with Top of the Gear Case Removed: The Cogged Wheels on the Axle are Mounted Free but are Bolted to Sleeves That are in Turn Bolted to the Drivewheels

SOME STRANGE VISITS SANTA CLAUS HAS MADE

Every Mother and Child in This Picture Is a "Christmas Opportunity" for Some One Who Is Ready to Help Santa Claus. These Are a Few of Many French Peasants Sent from the War Zone to Southern France, by Way of Switzerland. The Swiss are Shown Helping Them as Best They Can, but, as They Are so Far from Home, Their's will Be a Sad Holiday Time Unless Kind Folks Remember Them

Already the Children in the French Villages have Made Friends with Our Soldiers. Here They are Getting Acquainted with—What do You Suppose?—a Baby Lion Which Is a Pet of Some American Boys. If You will Look Carefully, You can See Where the Cannon Shells have Battered the Walls of These Village Homes and, of Course, Some of the Shells have Made Hearts in These Homes Sad. Here, Then, Is a Job for Santa Claus so Big That He will be Glad of Everybody's Help

Very Deep Snow Enabled Bishop, California, to Have a New Kind of Municipal Celebration Last Year. A Big Christmas Tree was Mounted on a Wagon and Drawn through the Streets by a Tractor, While Santa Distributed Gifts along the Way

AND STRICKEN FOLKS HE SHOULD NOT FORGET

When the Tired French Mothers with Their Babies Reached Switzerland on Their Roundabout Journey to Southern France the Good Red Cross Nurses Thought First of the Littlest Travelers. So Far as They Were Able, They Gave Them Clean Clothes, as You See Them Doing Here, and Nice Warm Baths. But the Red Cross Says It Has Not Near Enough Garments to Go Around and It Needs All the Baby Clothes That American Folks can Give

The Boy Scouts Pledge Themselves to Do a Good Turn Every Day and Those in Salt Lake City Surely Lived Up to That Ideal When They Started Out to Collect Shoes Which are to be Sent to War Victims, Young and Old, in France and Belgium. Everyone was Asked to Contribute Footwear Which a Little Repair would Make Serviceable. When the Lads Coöperating in the Scheme Completed Their Task, They had Gathered 15,000 Pairs of Shoes—Enough to Fill Several Rooms! One of Their Receiving Counters and Some of the Shoes are Shown Here

Many Modern Buildings Have No Fireplaces with Wide Chimneys for Santa Claus' Entrance, but as He Is a Very Persistent Old Santa He Is Sure to Find a Way In. Here He is Scaling the Wall of a 14-Story Hotel in San Francisco, Just Like a Steeple Jack, While Thousands Below Watch Him Breathlessly

CARRIER WITH WHICH TWO CAN MOVE HOSPITAL BED

In a hospital which shelters a large number of wounded soldiers a simple carrier has been devised with which a

Collapsible Frame with Which Two Men can Carry a Hospital Bed and Patient with Ease

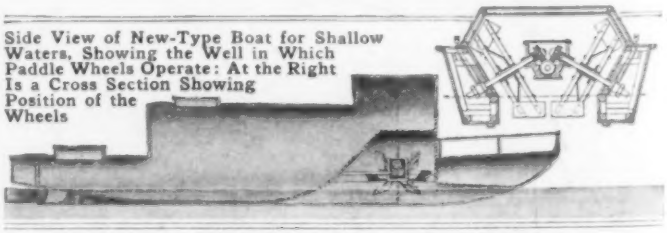
patient and his bed can be moved easily by two attendants, whereas four were formerly required for the task. It consists of a collapsible frame composed of two stretcher handles, 8 ft. 8 in. long, united by two jointed cross-pieces of iron hinged to the handles at a distance from each other equal to the length of a bed. This frame can be placed underneath a bed and then opened up so that it fits tightly between the legs and will not permit its burden to slide about while it is being carried.

NOVEL ELECTRIC MOTOR MADE LIKE A WHEEL

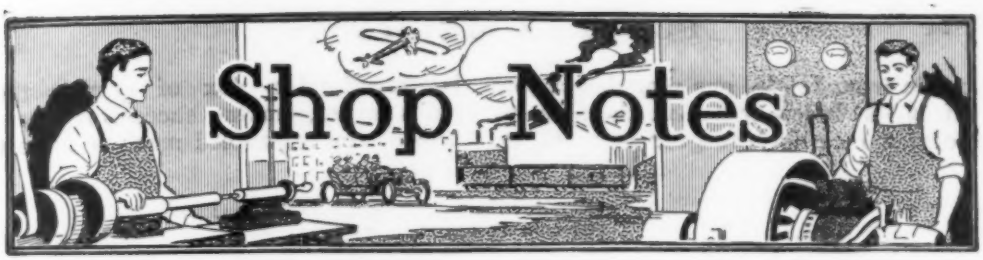
Novel features are to be found in a newly patented electro-magnet so designed that it can be used singly or in multiple as a motor to turn a shaft, or for other purposes. The core is of iron and is ring-shaped, composed of sections insulated from each other. This ring is supported by a spider, giving it a wheel-like construction. The coil surrounding the core is wound on a bobbin, in shape resembling an automobile-tire casing, there being a slot extending along its inner periphery, as illustrated herewith, which permits the core to revolve around its center. The bobbin is covered with wire, looped back and forth around pins arranged along either edge of the slot. Alternate loops of the wire are drawn close to the bobbin, while the others are wound more loosely. By energizing successive sections of the coil the core can be made to revolve or oscillate, as the specific use of the machine may require.

NEW TYPE OF MOTORBOATS FOR SHALLOW WATERS

A company has been organized in New Jersey to build power boats of a new type, designed by a resident of that state for use in shallow waters. The design is novel as to both hull and driving power, and was recently patented. It shows a boat of the flat-bottom type, but with a well in the bow, where the power for propulsion is located, instead of in the stern. Two paddle wheels work in the well on separate shafts, opposite each other and pitched at an angle of 60°, being driven by a worm gear operating in a grease-filled casing. An opening or channel leads from the water line under the bow to the well, and the paddle wheels draw the water through this channel and discharge it beneath the hull, where it is prevented by two outside keelsons from causing side wash to canal banks and levees, being discharged in a straight line at the stern. The engine exhaust is discharged into the well.



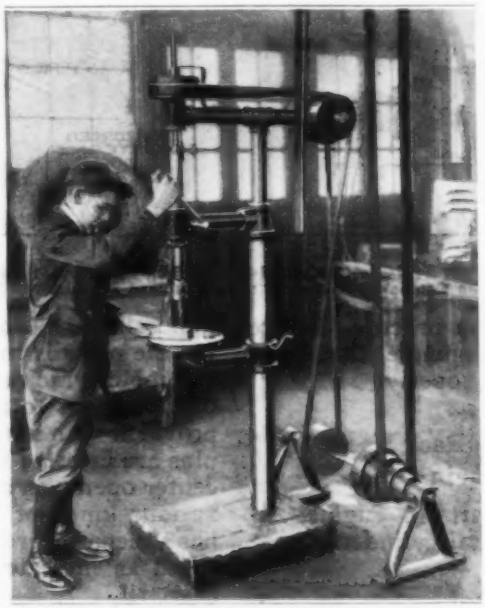
Side View of New-Type Boat for Shallow Waters, Showing the Well in Which Paddle Wheels Operate: At the Right Is a Cross Section Showing Position of the Wheels



Substantial Power Drill Press Made of Pipes and Fittings

By RAY F. KUNS

PRACTICAL mechanics who build small machines for use in their workshops, often make use of pipes and fittings and usually get fair results. By carefully working out a design for a drill press, which is suitable for construction with these standard parts, and giving special attention to the machining and joining of the various members, the drill press shown in the photograph and detailed in the working drawings, was made. It gives very satisfactory service, and compares favorably with standard machines of its size, though the cost was comparatively slight. It has stood up well under very hard service in a school machine shop. The design can easily be adapted to a smaller-size machine, or revised for special classes of work. It will carry a drill up to 1 in. in diameter. It has four changes of speed, ranging from 84 to 666 revolutions per minute.



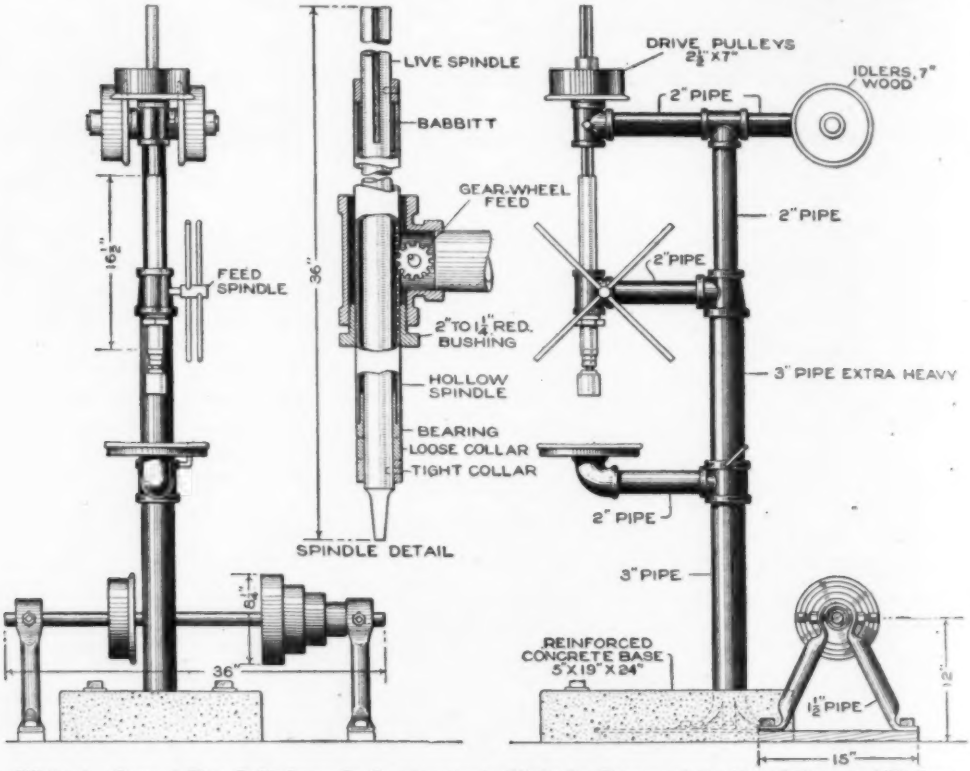
This Substantial Drill Press was Made by Boys in a School Shop, Pipes and Fittings Being the Chief Materials Used. It has Withstood Hard Wear

The main support is a 3-in. extra-heavy pipe. The height from the floor to the center of the spindle arm is 4 ft. 4 in.; from the floor to the center of the upper arm is 5 ft. 10 in.; from the center of the main support to the center of the spindle is 15 in. The arm which carries the table is adjustable on the pipe support, the latter being turned to a good finish. The tee, which slides on the post, is bored out to fit the latter, and is clamped by means of a threaded handle. The bottom of the main post is split, spread, and bolted to an iron plate. This is imbedded in the concrete base, as shown in the side view.

The tee under the drive pulley at the upper end of the spindle shaft has a bearing made from a piece of 1¼-in. gas pipe. This is first babbitted, then scraped, and the holes for the set-screws drilled and threaded. The same type of bearing is used in the hangers, four of which are required, two for the upper and two for the lower countershafts. The hangers are forged, as shown in the drawings, from 1½-in. gas pipe.

The gear wheel in the spindle feed is ¾ in. thick and 1¼ in. diameter. The teeth, 12 in number, are made from ¼-in. cold-rolled steel, set into tapped holes. The hollow spindle, which is

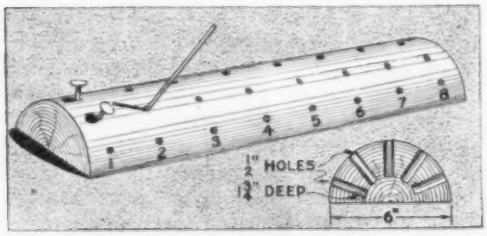
made from 1½-in. gas pipe, has a row of 9/32-in. holes drilled in the side, to form a rack for the gear to work in. The chuck should be procured before working up the live spindle, that these parts may be fitted properly.



While the Cost of This Drill Press Is Comparatively Slight by Reason of the Use of Pipes and Fittings, the Service It Gives Compares Favorably with Standard Machines of This Type and Size

Disassembling Rack Keeps Engine Parts in Order

When taking apart an engine, especially one of several cylinders, there is considerable risk of getting the parts mixed, making successful operation of the assembled machine almost impossible. A simple method of caring for the parts is to place them on a disassembling rack made of a heavy piece of wood, cut to the shape shown and provided with numerous holes in which pins are inserted for small parts having center openings, and providing also for various kinds of rods. Each cylinder has a separate row on the rack, numbered as indicated.—J. J. Green, Chicago, Ill.



The Engine Parts are Placed Systematically on the Rack When Disassembling, Thus Insuring against Mixing Up the Parts Easily

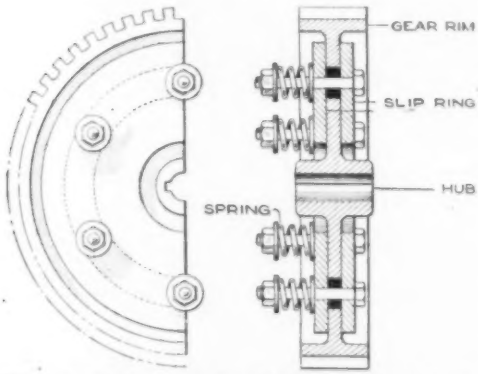
Simple Method of Soldering Granite Ware

Many persons have the impression that it is almost impossible to repair a leak in a piece of granite ware, but if the following method is tried, the amateur will have perfect success. With a sharp file cut away the porcelain, and

buff the exposed metal until it is shiny. Apply soldering acid, and with a hot iron apply half-and-half solder, the same as one does in soldering tin. The solder will repair the leak permanently, for we have pieces of granite ware mended in this way in our kitchen, and they have been in use several months since repairing.—John F. Robinson, North Adams, Mich.

Slip Gear Minimizes Breakage of Teeth

On many kinds of machinery where inexpensive cast gears are used, as well as in some other cases, a type of gear has been found useful for preventing undue breakage of the teeth. Heavy strain is caused on the gear teeth by sudden stopping, starting, or reversing, and a gear in which the hub is separate from the rim, the two sections being held together by slip rings as shown in the illustration, gives the proper relief to the gear teeth. The slip rings are bolted securely with tension springs. When the strain becomes too great, the outer ring revolves, and the hub remains stationary until normal conditions obtain.—C. Van Den Berg, Jr., Gadsden, Ala.

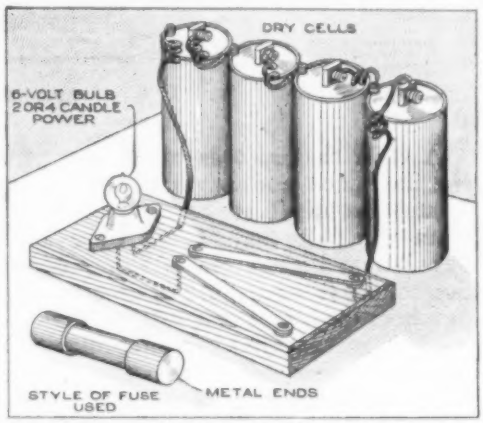


When the Strain on the Gear Teeth Becomes so Great that Breakage may Result, Damage is Prevented by the Slipping of the Rings

¶A coating of paraffin oil should be applied to the surface of freshly cleaned iron to protect it from oxidation before the paint is applied.

Test Box for Electrical Fuse Cartridges

For testing electrical fuses of the cartridge type, to determine whether or not they were serviceable, a small outfit was rigged up as shown. Brass strips were mounted on a board with screws so that fuses of various lengths could be tested by setting them across the strips with the metal ends of the fuse in contact with the brass. If the fuse is good, the small electric bulb is lighted when in circuit with the dry cells.—A. E. Rounds, Milwaukee, Wis.



The Fuses are Placed in Circuit by Setting Them across the Brass Strips, and the Bulb Lights as the Current Passes through a Serviceable Fuse

Portable Tool Rack for Mill Room Aids in Checking Up Tools

It was customary in a certain plant to "clean up" the mill room every Saturday afternoon. Upon the arrival of the mill hands on Monday morning it was discovered that various tools, such as squares, rules, straightedges, etc., were missing, and it was only after lengthy search that the tools were found in obscure corners or drawers. To overcome this, an A-shaped tool rack was constructed, 5 ft. long and 2½ ft. high, and provided with casters. On "clean-up" day various tools are placed on hooks on the rack, which is pushed around the shop, and finally taken to the tool room.—Joseph Plogmann, Cincinnati, Ohio.

A Long Island Scooter Driven by a Motor Aero-Propeller

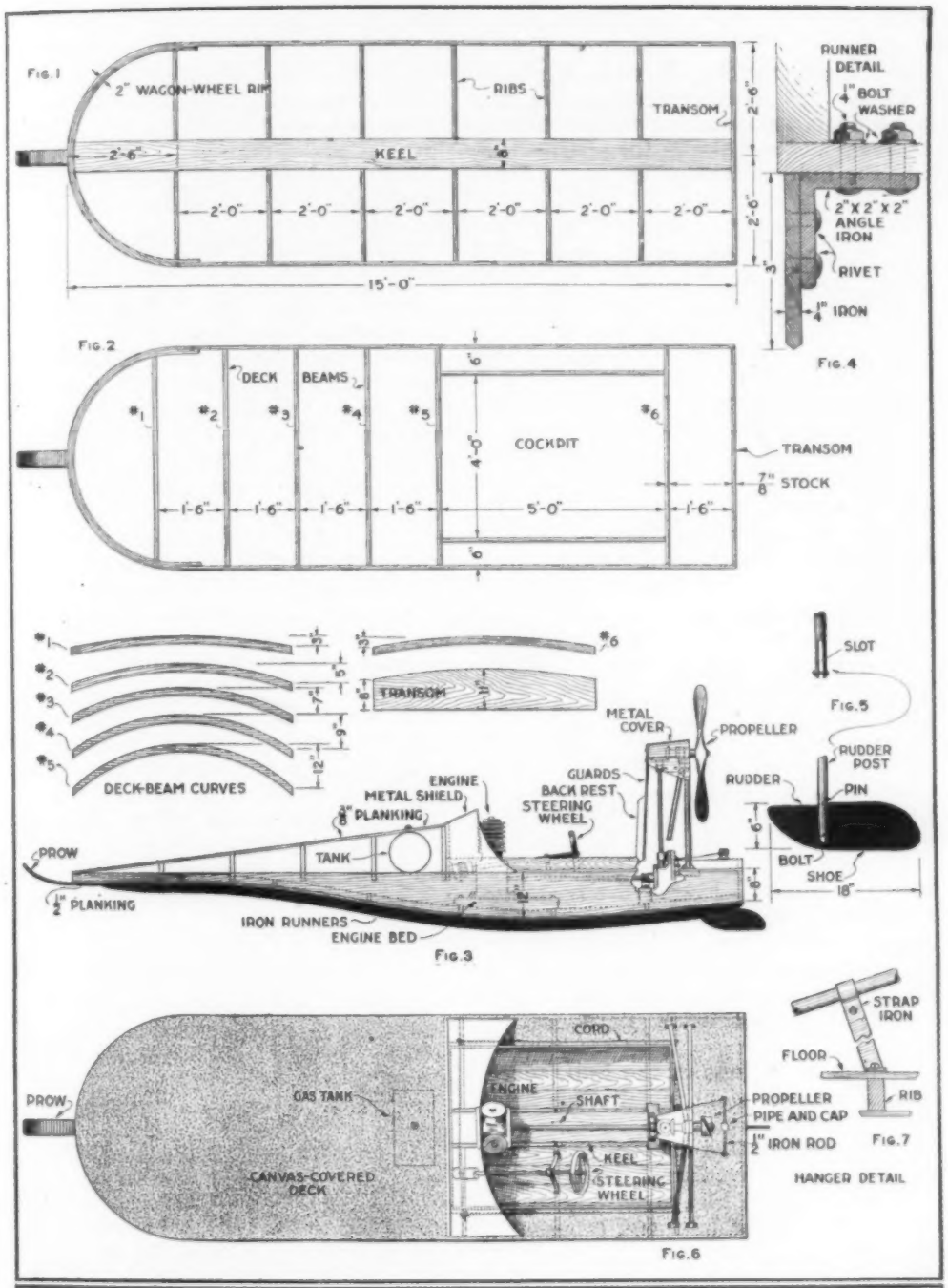
By L. B. ROBBINS

A craft that affords much sport for the ice speed enthusiast is the "Long Island Scooter," which gets its name from the fact that it has long been popular on the waters of Long Island Sound. It is something of an amphibious boat-sled, and can sail on the ice, on ice-covered land, or on broken ice with stretches of open water. The original scooter is a sailing craft, rigged in various ways, like an ice sailboat. With the power from a gasoline motor of about 4 hp. applied to an aero-propeller of 3-ft. sweep, the scooter has a much wider range, and is practically independent of wind and weather during its season. It is controlled from the driver's seat at the steering wheel, like an automobile or speed motorboat, as shown in Figs. 3 and 6. The installation for the motor and control mechanism is arranged convenient to the steering post, within easy reach. The engine is set well forward in the cockpit, and the steering wheel on the port side, leaving room for a passenger, or cargo, on the starboard side.

The strong iron runners make the scooter ride easily, and also stiffen the hull. The iron prow aids in climbing over rough areas, and prevents the bow from crawling under ice ledges, when leaving open water. The engine may be of various types, and that indicated is a double-cylinder motor of about 4 hp., air-cooled, developing 500 to 700 r. p. m. on the main drive shaft, and 1,500 to 1,800 r. p. m. on the propeller shaft. The driving mechanism is suggestive only, since many mechanics prefer to devise these features to suit the materials and facilities at hand. This installation may also be left to a professional gasoline-motor mechanic, only the hull and minor fittings being homemade.

Begin the construction by making the framework, shown in Fig. 1. The sides are of 7/8-in. pine, cut 12 in. wide at the middle, 8 in. at the stern, as shown in Fig. 3, and 2 in. at the junction with the wagon-wheel rim, at the bow. The use of a wagon-wheel rim, of oak, which can be obtained of a wheelwright, makes it unnecessary to do the tedious work of steaming and bending this heavy material. The rim is bolted to the sides. The ribs are of hard pine, 7/8 by 2 in. in section. The stern transom, as detailed, is fastened into place with galvanized-iron screws, which are to be used throughout, instead of plain iron screws, as they withstand the water better. The keel, of pine, 1 by 8 in. in section, is laid on the ribs and fastened with screws.

Place the frame, bottom side up, on sawhorses, and plank the bottom with 1/2-in. pine, or cypress, boards. Set the nail heads and clinch the nails well on the inside. Plane the bottom off smooth and apply a coat of priming paint to the hull. Next cut the deck beams, as detailed, for the various stations. These beams may be steam-bent or cut, 2 in. wide, from a good quality of 7/8-in. stock. Nail the beams into place, as indicated in Fig. 2. Beams Nos. 5 and 6 are set 5 ft. apart, to make a frame for the cockpit, with the beams at the side coaming set 6 in. from the sides. Plank the deck with 3/8-in. cypress, or pine, and cover it with canvas, if desired. Boards for the floor, of 1/2-in. stock, may be fitted into place, but should not be nailed down until the



The Scooter Is an Interesting Mechanical Construction for the Winter Speed Enthusiast. The Craft may be Made and Installed Complete by the Builder, or He may Make Only the Hull and Its Fittings Other Than the Power Plant and Driving Mechanism. Fig. 1 Shows the Hull-Framing Plan; Fig. 2, the Deck-Framing Plan; Fig. 3, a Side Sectional Elevation; Fig. 6, an Assembly Plan, and the Other Figures, Details of Construction

other interior fittings have been placed finally. Fit the supports under the after deck, for fastening the machinery fittings, and set blocks for strengthening the hull at the rudder post, as de-

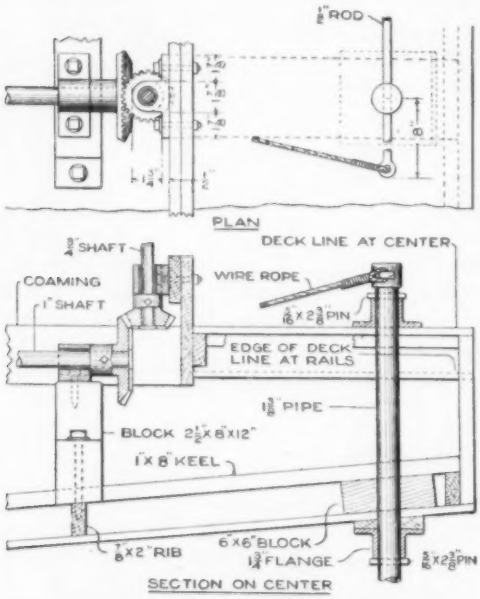


FIG. 8

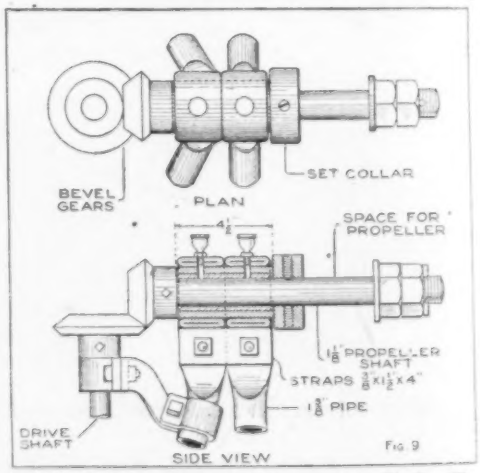
Details of Construction at the Stern: The Section on the Center Shows the Fitting of the Gears and Connections of the Main Drive Shaft and the Vertical Shaft, and the Fitting of the Rudder Post. The Plan Shows a View from Above

tailed in Fig. 8. Fasten the coaming around the cockpit, and build a suitable base for the engine. The metal shield, in front of the engine, can be fitted handily before the machinery is installed, and laid aside until finally needed.

The metal fittings of the hull, apart from the power-plant installation, may be considered next. The runners are shaped, as indicated in Fig. 3 and in the detail drawing, Fig. 4, from 1/4 by 3-in. sheet iron. The stern end is tapered off, and the bow end is tapered and curved in, to match the curve of the rim. The runners are fastened by means of angle irons, as detailed, and bolted through the floor, or the floor and iron straps, hung over the top edges of the ribs, adjoining the inner sides of the hull. A metal prow, 3/16 by 4 1/2 in. in section and hammered to a slight dished effect crosswise, extends 15 in. beyond the bow rim, and is bolted to the bottom and keel. The rudder is of sheet iron, as detailed in Fig. 5. The lower edges of the runners and the rudder are sharpened slightly to give a good grip for steering the craft on the ice.

The installation of the steering mechanism is shown in plan in Fig. 6, in a side elevation in Fig. 3, and in detail, as to the steering-post fitting, in Fig. 8. The crossbar of the rudder is fastened to a pliable steel cable, 3/16 in. in diameter, and this is reeved through suitable pulleys to carry it around the cockpit coaming, as shown in Fig. 6. The cable passes through the coaming at each side near the front end of the cockpit, and is wound about five turns around the 3-in. wooden drum, fixed to the steering post. The steering post is of pipe, 1 1/4 in. in exterior diameter. Its lower end is set into a metal flange, its upper end is shouldered with a threaded collar, and the steering wheel screwed on and suitably capped. The steering post is braced by a hanger of 1/4 by 1 1/4-in. strap iron, as detailed in Fig. 7.

The details of the rudder post are shown in Fig. 8, which also shows the details of the gearing shafts and bear-



Details of Construction at the Propeller Shaft: The Supporting Standards are Forged around the Propeller-Shaft Bearing, and the Vertical Shaft is Held Rigid, at Its Bearing, by a Strap-Iron Bracket

ings at the junction of the main drive shaft and the vertical connecting shaft.

The rudder post is a pipe of 1⅜-in. exterior diameter. It is carried at its ends in pipe flanges bored out to a snug fit. Two round steel pins hold the post in position. A pipe cap at the upper end carries the rudder crossarm, as detailed in the plan. The main drive shaft is carried in a solid bearing, suitably babbitted, or provided with a bronze bushing. The bearing is bolted to a heavy block, as shown. The bevel gears are of machine steel, and are in a ratio of two to one, the smaller gear being of 3-in. pitch diameter. The vertical ¾-in. shaft is carried in a similar smaller bearing, bolted to the reinforced coaming.

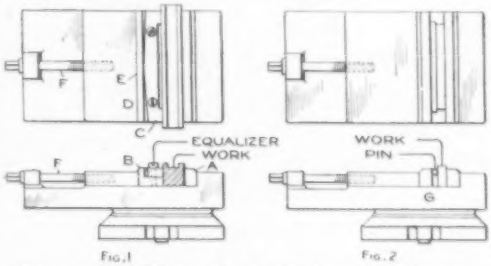
The general arrangement of the propeller shaft and its connections and supports is shown in Figs. 3 and 6, and in detail in Fig. 9. A bevel gear of 4½-in. pitch diameter transmits the power from the ¾-in. vertical shaft to the 3-in. bevel gear on the 1⅛-in. propeller shaft. The latter is carried in a bearing made from a seamless steel tube, provided with a suitable bronze bushing and oil cups. A set collar and jam nuts, as well as a keying, or other standard device employed on aero-propellers, hold the propeller in place. The bearing is held solidly in a housing forged into the standards of 1⅜-in. pipe, which support the propeller shaft and connections from the stern deck. The forged pipes are fitted snugly around the bearing, and clamped to it by means of two straps of iron, and bolts, as shown. The vertical shaft is carried in a bearing similar to that used at its connection with the main drive shaft, as indicated in Fig. 8. The bearing is supported rigidly by a brace of 5/16 by 1½-in. strap iron, bolted to the forward pipe standards. The lower ends of these standards are split and forged to provide a flange for secure bolting at the reinforced points of fastening on the deck.

The gearing, etc., of the propeller shaft is covered by a sheet-metal hood, as shown in Figs. 3 and 6, as a safety measure, and also as a protection for the machinery. The hood is braced in front by two iron guard rods, as shown in Fig. 3, which support the back rest for the driver and passenger. This rest is also essential in guarding the occupants from the machinery, and the main drive shaft should also be guarded. The driving mechanism, and especially the gearing connections and sizes, are suggestive only. They must be worked out according to the requirements of the power plant used. The propeller may be made or purchased complete.

Devices for Gripping Stock Accurately in a Vise

When gripping work which is rough in a vise, a frequent source of trouble is that the vise grips on one corner only. In milling or planing, the work is likely to be torn from the vise. To overcome this, the vise can be equipped with a simple jaw which equalizes the grip on the work. A jaw adapted to gripping rough stock is shown in Fig. 1. A is the fixed jaw and B the movable jaw. Attached to the movable jaw is the piece C, held in position by two screws D. This movable piece butts against the movable jaw, at E, and as the jaw is tightened by the screw F, the movable piece pivots at E, adapting itself to the work.

Another method of gripping the work is shown in Fig. 2. The purpose of the pin is to insure against the jaws



These Simple Methods of Gripping Work in Vises Are of Wide Use

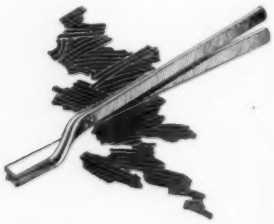
pinching on the lower edge of the work G, causing chattering. These methods are good when gripping finished work that is not parallel.—H. M. Frank, New York, N. Y.

Novel Method of Strapping Money Satchel to Messenger

A paymaster, who carries a small satchel for his money and accounts, has devised a novel method of strapping the satchel around his shoulders, as shown in the sketch. A strong strap is fastened to the handle of the satchel and passes up his sleeve, around the right shoulder, and back to the sleeve across the chest. This gives him the free use of both arms in his work, as well as in defense against attack in an emergency.

Blacksmith's Tongs Made of Iron Strips Bent Cold

When a pair of heavy tongs are needed for an occasional job of forging, and blacksmith tongs of the usual pattern are not at hand, a substitute can be made quickly of two iron strips bent to the form shown in the sketch. No forging is necessary, as the metal can be drilled for a bolt and then bent cold making proper allowance for the size of work to be handled.—J. A. Ryan, Buffalo, N. Y.

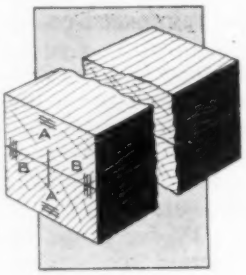


Polishing Overhead Shafting

In a large factory the brightly polished overhead shafting was quite noticeable. The method used to keep the shafting clean and free from rust was this: A pad covered with emery cloth and fastened to a long pole was held against the revolving shafting. The workman, reaching up with the pole, pressed the emery surface against the shafting, as desired, a fine polish resulting.—F. M. Ball, Kansas City, Missouri.

Centering Halved Pattern Work in a Lathe

The centering of pieces for halved, or split, patterns in the lathe is often done inaccurately, so that the halves are not equal, and have to be thrown away. A good method is to plane one surface parallel with the parting surfaces, and square up the ends from it. Fasten the pieces together, and, with dividers, scribe lines on both ends, as at A and B. When putting the work in the lathe, center as usual, but do not drive the centers home. Turn down to the outer series of lines, and stop the lathe. The slightest error will be easily detected, as some of the lines will be nearer the cut than others. Tap the wood to center it properly, and set the dead center in slightly. Turn down a small portion, and examine the work, setting it so that it is accurately centered.—D. D. Gurnee, Hempstead, N. Y.

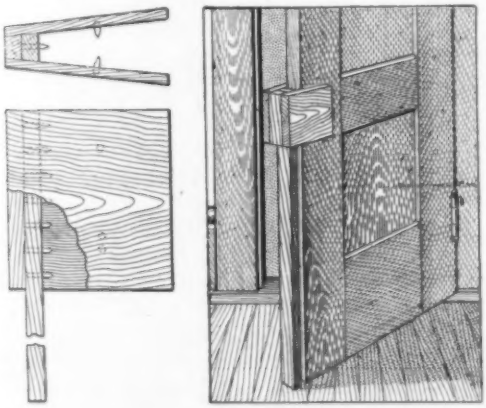


Collar Setscrews Made from Ordinary Setscrews and Nuts

Fifty collar screws were needed in the shop, and not being able to obtain them locally, we made them as follows: A setscrew of the required size was taken, and a nut screwed very tight up to the head, with a wrench. The screw was then put in a spring collet in a lathe. The corners were broken with a tool, and then smoothed off with a file. This makeshift served the purpose exactly as well as the real article, and could not be noticed by a casual observer. The saving in time was considerable.—S. B. Royal, Baltimore, Md.

A Door-Lock Mortise Gauge That Saves Time

In setting a number of door locks, a gauge is desirable, and is preferable to a template. The door-lock gauge shown in the illustration will do as good work on the hundredth door as on the first. It centers the bit with accuracy every time, does away with the use of a clamp, and is rapid in action. A vertical strip is used, 1 in. thick, of the same width as the thickness of the door, and of a length to the height of the lock from the floor. Small holes are bored through the longitudinal center line of the face of this strip, and at a distance corresponding to the diameter of the bit to be used. Short nails are driven through these holes, as shown. The heads of these nails are covered by a nailed strip beveled. The sides, containing the nail points for marking the hole centers for the shank and the keyholes, are then nailed to the beveled sides of the vertical strip, the bevel spreading them so that the nail points will not scratch the door when the gauge is slipped on.

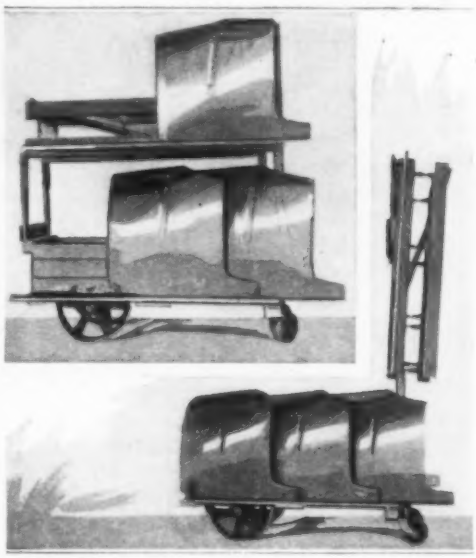


The Centers for the Bit in Boring Mortises and Fitting Holes for Door Locks are Accurately and Quickly Marked with This Gauge

To operate, simply set the gauge on the floor, push it against the door, and then strike sharp blows on the back and sidepieces. The holes will be sharply centered, ready for the bit to follow.

Shop Truck with Folding Upper Deck

A truck that has many uses in manufacturing establishments was developed in a shop where automobile



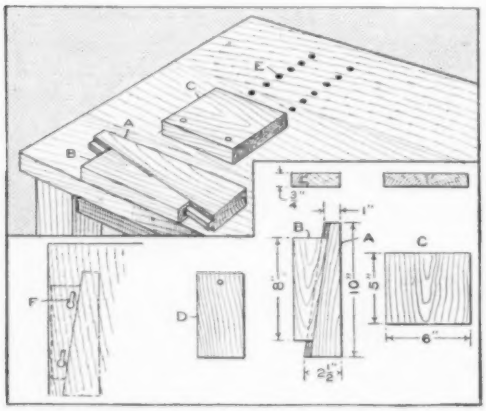
A Large Load is Carried on This Double-Deck Truck, and the Pieces are Not Easily Marred While being Loaded and Unloaded

cowls are finished. The pieces are piled or nested on the lower deck when the upper deck is raised, as shown. This minimizes the marring of the cowls. The upper deck is then folded down and the load stacked on it.—Alfred J. Bell, Detroit, Mich.

Combination Bench Stop and Wedge Clamp

A bench stop that is firmly fastened to the top of the bench is often in the way, and it is sometimes undesirable to provide a metal one that is mortised into the bench top. The stop shown in the sketch overcomes these objections, and has the added features that it is widely adjustable and can be made quickly. The adjustable wedge portion of the clamp consists of two parts, A and B, sliding in a tongue-and-groove joint. This tends to keep the pieces in place and to prevent them from springing up from the bench when

in use. The front piece B is fixed to the bench by means of two screws driven into it from below. Two holes are bored in the bench top and slots extended from them, as shown at F.



This Homemade Bench Stop Is Adjustable to a Wide Variety of Work

The piece B is set in place, and flathead screws are driven into it from the two holes in the top. By pushing the strip forward it is held firmly in the grooves. The screws may be adjusted to give the block B the proper tension. The block A should be planed off slightly on its lower side so as to slide properly. A double row of holes is drilled in the top of the bench, as at E, and a block, C, made to fit them by means of pegs. This block may be adjusted according to the width of the piece being clamped. For use with irregular-shaped pieces, a block, D, having only one peg, is useful.—Henry Simon, Laguna Beach, Calif.

Large Clockface Fitted on Small Clock

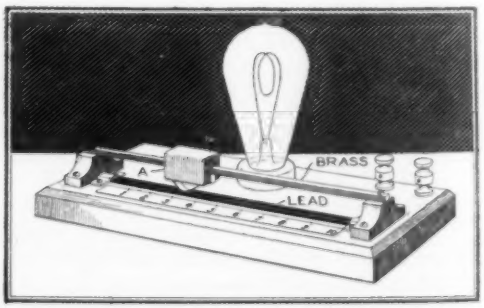
Desiring a large clock with a face 2 ft. in diameter, I easily constructed one by using a dollar clock to operate the hands. First I took the glass and hands from the clock and put brass extension tubes on the posts of the hour and minute hands. These extension tubes give the necessary projection through the large clockface to accommodate the large hands. Each tube should snugly fit its post, one inside the other, the inner tube being half an inch longer than the outer one. For the face, I cut a disk 2 ft. in diameter from tin, and painted it white with hour figures in black. Directly behind this I fastened the dollar clock. The large hands were cut from thin aluminum strips, and fastened to the tubes. This clock serves the purpose, and keeps good time, saving the cost of a large wall clock.—W. H. Raymond, Boston, Mass.

Safety Pen Clip Fitted to Nose-Glass Pocket Case

Mechanics in the shop and on the job, who wear glasses occasionally and keep them in a pocket case much of the time, find it difficult to keep the case from falling from the pocket. A simple remedy is to fit an ordinary clip, of the type slipped over a fountain pen, to the case, riveting the clip into place. The two wings of the clip which grip the barrel of the fountain pen, are flattened out to fit against the back of the case, which is usually of metal. The lining of the case is removed sufficiently to permit riveting, and then glued back into place.—A. D. Fleck, Yonkers, N. Y.

Sinusoidal-Current Electrical Treatment at Home

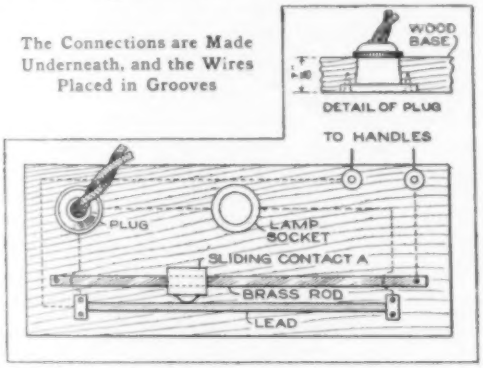
Sinusoidal electrical current is used extensively in sanitariums for treatment, and can be provided at home as handily as that from the common medical coil. Graphically, a sinusoidal current is represented by a smooth wave



The Intensity of the Current is Regulated by Moving the Contact A along the Lead Strip

form, whereas the current from an induction coil is very irregular, and consequently comparatively unpleasant. A much stronger current of the sinusoidal variety can be "taken" at the usual handles provided.

A true sinusoidal current for home use—therapeutic or experimental—can be provided inexpensively where the usual alternating-current supply is available. The main element in the apparatus is the lead removed from a carpenter's pencil. These leads, of good quality, have about 200-ohms resistance. Connect this lead in series with an incandescent lamp, as shown, and then make temporary connection with a pair of handles. The current felt in the arms should become quite strong, and finally unbearable as the point A is moved to the right. By means of the sliding contact, a source of current



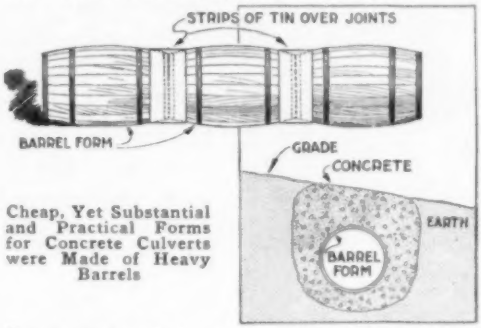
The Connections are Made Underneath, and the Wires Placed in Grooves

supply controllable from zero to the maximum is available.

The illustration shows the construction. The base is of wood, 4 by 9 in. long. A porcelain lamp receptacle is set in as shown, and directly above the lead, which is held down by a strip of brass at each end, is placed a square rod of brass carrying a sliding contact, A, such as is used in wireless apparatus, or made from a block of wood or fiber. Two binding posts make connection with one end of the lead and the sliding contact. The supply cord is connected by means of a screw plug. All connections are made underneath, the wires being placed in grooves, and felt is pasted over the bottom.—John D. Adams, Phoenix, Ariz.

Old Barrels Make Inexpensive Concrete-Culvert Forms

Vinegar casks, or other heavy barrels, provide excellent concrete forms for small culverts, or concrete drains.

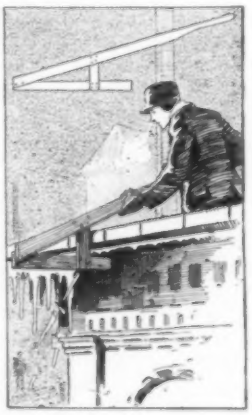


Cheap, Yet Substantial and Practical Forms for Concrete Culverts were Made of Heavy Barrels

Both ends of the barrel are left in place before concreting, to give stability to the form, and strips of sheet iron are nailed over the joints between the barrels, to close them. To remove the form after concreting, knock out the ends and remove one stave in each barrel, and the rest of the form comes away easily.—Roy H. Poston, Flat River, Mo.

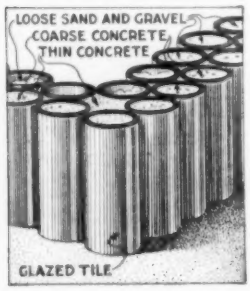
Scraper for Removing Ice and Snow from Cornice

The eaves of a flat-topped roof were cleared of icicles and snow quickly and easily in the following manner: A scraper was constructed as shown. The crosspiece acted as brace and guide, and the upper piece as a handle. The man doing the cleaning walked along the edge of the roof, holding the device by the handle, and pushed it along, the brace bearing against the cornice. The lower piece cut off the icicles.—B. L. Dobbins, Attleboro, Massachusetts.



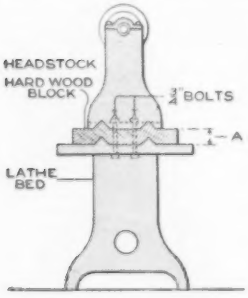
Foundation Wall Built of Tile and Concrete

For various small buildings on the farm, a foundation wall built up of hard-glazed 6-in. tile and concrete has been found effective. Its first cost is reasonable, and the foundation can be built easily by unskilled labor, in a short time. The tile are set on end, close together in a row, as shown, to form the outer side of the wall. The inside row of tile is set staggered with the first row, as shown, and filled with loose, dry sand and gravel. The intervening spaces are filled with cement grouting. The outer tiles can be filled with concrete, or a mortar made up with stones and gravel.—T. J. Hubbard, Mendota, Ill.



Enlarging Diameter Capacity of Wood-Turning Lathe

Having a number of pieces to be turned out on a wood lathe that were too large in the rough to be placed in the machine, I hit upon the scheme shown in the sketch for raising the headstock and tailstock sufficiently to overcome this difficulty. The arrangement consists of two hardwood blocks, shaped to fit between the headstock and bed frame and between the tailstock and bed frame, and of sufficient thickness to accommodate the work. The width and length of the wooden pieces are suitable to the parts under which they rest. The wooden pieces are held in position by bolts, as shown.—H. P. Roy, Kansas City, Mo.

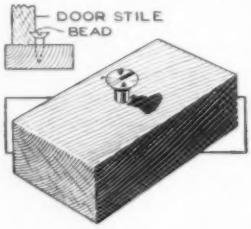


Long Coil Spring Holds Auto-Starting Crank

The starting crank of an automobile is sometimes lost or damaged when left to hang from its pivot. By supporting it with a long, light coil spring, fastened neatly with cords or wire across the front of the frame, it is kept from rattling, and is not easily damaged or lost.—E. T. Coyne, Buffalo, New York.

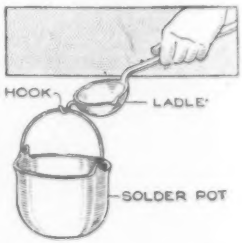
Bead Plane Made of a Wood Screw and Block

Often the home woodworker, or even the mechanic in the small shop, requires a bead on a strip for a door stile, or similar uses, when he has no bead plane at hand. A quick method of making beads at the edges of such strips, is by means of a wood screw, set into a block as shown. The width of the bead can be regulated somewhat, and the depth cut to the limit that the screw head will permit, as indicated in the detail diagram.—E. K. Wehry, Cedar Rapids, Iowa.



Solder Ladle Arranged as Crucible Carrier

A convenient addition to an ordinary ladle used for pouring solder or babbitt, is a small hook riveted on the front edge of the ladle, as shown. This makes a safe holder for the solder pot or handled crucible. Combining the ladle feature with the carrier saves time and prevents accidents that may result from using makeshifts.—A. Gemmell, Ansonia, Conn.



The Selection of Illuminating Units for Home or Office

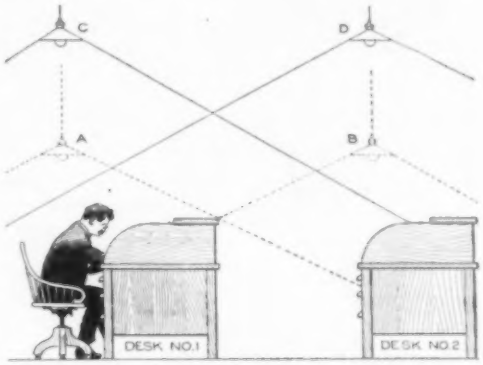
By K. M. COGGESHALL

The first rule to be remembered in planning artificial lighting is to avoid the use of a very bright spot in a poorly illuminated room. Such a condition prevents concentration, as the eye involuntarily fixes itself on the bright light. There should be a general illumination with additional lamps for local use, if necessary. It is best that only reflected light reach the eye; the source of illumination should be so placed that the direct rays are thrown on the work, and not in the eye. Precautions should also be taken to hang the light unit above the working plane in such a position that distracting shadows are not cast by the furniture or office fixtures, as indicated in one of the sketches, at A and B, as compared with C and D. The higher lights provide better light for both desks, No. 1 and 2, without shadows.

The illumination of a home is perhaps of first importance. If the rating used by manufacturers in classifying standard tungsten lamps is employed, the reception room, library, or living room should have an intensity of .9 watt per square foot of floor space. For instance, if the library is 12 by 16 ft. the floor area is 192 sq. ft. At .9 watt per square foot, about 173 watts are necessary for proper illumination. This value is approximated by using three 60-watt tungsten lamps.

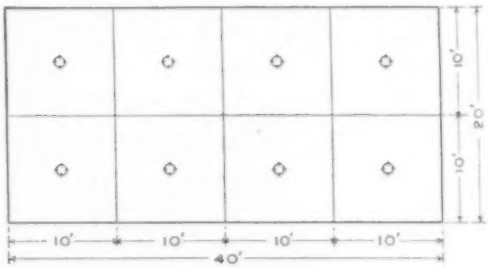
The dining room should have a general illumination of about .4 watt, while the den should have at least .85 to .95 watt per square foot. It is necessary that the latter room be well lighted, as it is generally used for reading, writing, or playing games. Hallways, pantries, and closets should have an illumination of .2 watt. For the sake of sanitation, the illumination of the kitchen should be at least 1.3 watts per square foot. The lamps should be grouped under a cheap, yet efficient, 12-in. white-porcelain reflector near the ceiling. For the bedrooms .3 watt per square foot is satisfactory.

For the average office, an illumination of 1.3 watts per square foot of floor space is sufficient, except in instances where a great deal of stenographic or copy work is done, when



The Higher Lights Provide Better Light for Both Desks, and without Troublesome Shadows

the factor is 1.45 to 1.7 watts. For drafting work the range is 2.45 to 2.75 watts. The subject of spacing of the units is important. It presents a problem which cannot be entirely solved by mathematics; the answer is influenced by individual judgment and the cost of installation. The room should be laid out in sections of equal area, as shown in the other sketch. After the total watts per room have been determined, each section should be allotted its share. Standard lamps should then be installed in the center of each section. For the office, these lamps should be hung 12 to 14 ft. from the floor, while in drafting rooms, mountings as high as 16 ft. are sometimes desirable. Where

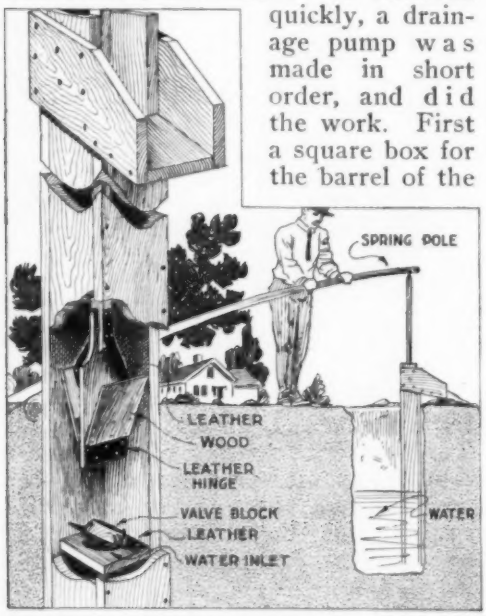


The Room is Laid Out in Squares and Each Section Allotted Units for Proper Illumination

the ceiling is low, limiting the available mounting height, it is desirable to use smaller spacing, and more lamps of smaller candlepower each.

Drainage Pump Improvised on the Job

On an excavation job where water was struck, and had to be removed quickly, a drainage pump was made in short order, and did the work. First a square box for the barrel of the



This Crude Form of Plunger Pump was Rigged Up on the Job When Water was to be Removed from an Excavation Quickly

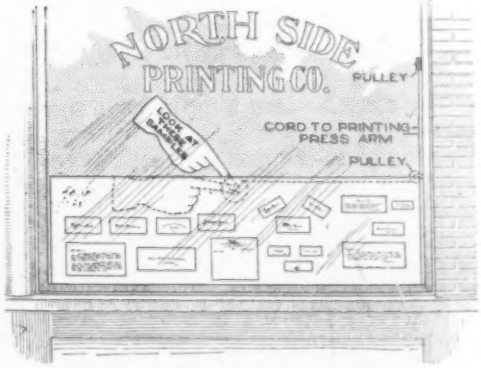
pump was made, and a valve block with a leather-and-wood valve cap, as shown, was fitted into the pump near the lower end. A spout was fixed near the upper end. The plunger was made of a square pole, at the lower end of which a water lift was rigged, as indicated. Two sections of wood were hinged to the central piece and braced by straps. When the pump plunger is lifting a load, the wooden hinge pieces are weighted down and form a close contact against the sides of the pump barrel. When the plunger is lowered into the water these pieces fold back against the center piece. The parts must be fitted closely to give good results. A spring pole was attached to the upper end of the plunger, and fastened at one end by means of logs.

Pencil Held to Teeth Detects Knocks in Inclosed Machine

When part of an inclosed machine, for example a blade in a centrifugal pump, is pounding slightly, the affected locality needing adjustment can often be found without removing the casing. The operator touches the casing with a hard pencil point, the butt of the pencil being against his front teeth. The vibrations due to the pounding will attract his attention to the place to be adjusted without removing the casing to locate it.—R. Z. Kirkpatrick, Washington, D. C.

Moving Hand Draws Attention to Window Display

Moving objects in window displays are good means of advertising, as they command attention. A printer having a sample case built directly underneath his show window, had a large hand painted on tin, on which was inscribed "Look at These Samples." He then fastened a wheel to the pointing finger, and connected it to the arm of a printing press near by, by means of a series of grooved pulleys and a string. It was adjusted so that at each revolution the hand would be raised pointing to the samples in the case. As the press

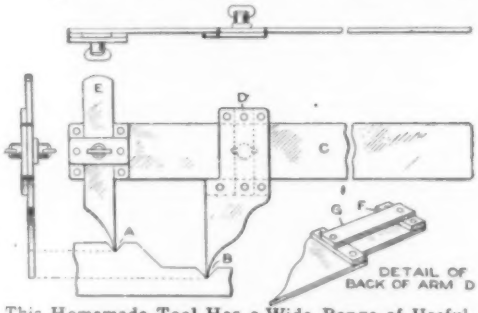


The Hand is Connected to a Near-By Printing Press by a Cord and Pulleys, so That It is Raised and Lowered by the Revolution of the Press Shaft

reaches dead center, the hand remains stationary for a moment, and then disappears from view.—M. J. F. Schramm, Brooklyn, N. Y.

Special Sliding Caliper Useful on Many Jobs

The usefulness of a sliding caliper can be extended by making the legs pointed and providing the end leg with a vertical adjustment, as shown. A typical example is in scaling the distance between two points not in the same plane, as the points A and B. The body C of the caliper is made of machine steel. The legs D and E are made of the same material and shaped as indicated. The slides on the legs are made by riveting two strips of sheet metal, F, and a third, G, to the leg, as detailed. A thumbscrew through G clamps the leg. The leg E is constructed as shown, a small strip being riveted on the front. The legs may also be machined from solid pieces, the slots being drilled and filed. The leg D may

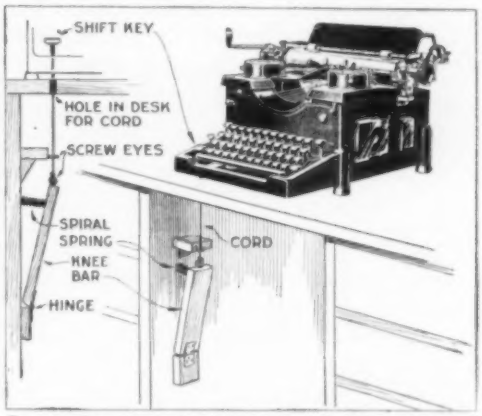


This Homemade Tool Has a Wide Range of Usefulness on Work Not Practicable with an Ordinary Caliper

also be made with a vertical as well as a lateral adjustment.—William A. Robinson, Waynesboro, Pa.

Knee Lever Actuates Shift Key on Typewriter

An unskilled typist, of the "two-finger" school, found that time was lost in striking the shift key, as this operation took one of the two fingers. In order to save this lost motion, he bored a small hole through his desk directly below the machine, and ran a cord through it, the upper end of which was hooked over the shift key of the typewriter, as indicated. A knee pedal was arranged as shown. The upper end of the pedal was connected with the string, which passed through an eye, to give a straight pull on the key. To strike a capital, the knee is pressed

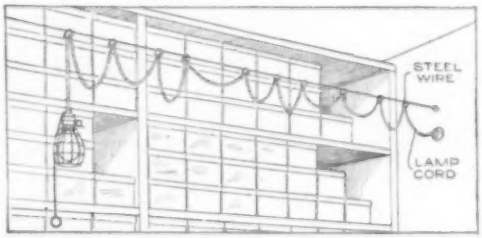


Greater Speed can be Attained on the Typewriter if One or More of the Shift Keys are Controlled by Pedals

against the pedal, giving the operator greater speed. This arrangement is practical even for a skilled typist.—John D. Gilbert, Eugene, Ore.

Lamps for Stock Room Shifted along Horizontal Wires

Below long rows of shelves or racks in stock rooms, it is sometimes necessary to install an electric-lighting system. The method generally used is to have an incandescent lamp on a long cord, the latter dragging on the floor, as the lamp is moved from one portion of the room to another. A better plan is to stretch a steel wire down the center of the aisle, high enough above the



The Light is Moved Along the Wire, and the Cord does Not Drag on the Floor

floor to be over the heads of the clerks. At points 2 ft. apart, rings are fastened, as shown. The lamp cord will be out of the way, and protected from injury. —B. E. Waller, Omaha, Neb.

Brake Band Repaired with Spring-Steel Strap

The point at which the brake band of an automobile usually breaks is opposite the opening, as shown in the sketch. I found that, by making a repair at this place with a strap of spring steel riveted into place as detailed, the brake band was stronger than when originally fitted. The spring steel at the break gives the band elasticity, and its strength is equal to, if not greater than, that of the metal where the break usually occurs. When I bought two new brake bands, I had them sawed in half at the point where the break usually occurred and joined by this method.—C. H. Thomas, Kennett Square, Pa.

Rubber-Covered Instrument Knobs Made from Sink Stoppers

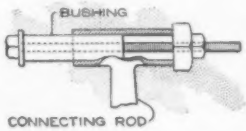
The furnishing of suitable knobs for rotating shafts on small instruments, and similar constructions, is often a problem to experimenters. Many forms of cheap and attractive insulated handles, or knobs, can be made by fitting rubber sink stoppers, or even chair-leg tips, to common wooden, or other, knobs. The addition of these soft-rubber coverings is desirable where a firm grip for turning a shaft is necessary. —R. U. Clark, III, Newton, Mass.

Small Floor Pit Convenient for Sheet-Metal Work

In a shop where much cutting was done with large hand shears, it was found that the most convenient way to do this work was to provide a pit in the floor, about 30 in. deep and 4 ft. square, in which the workman stands. This gives him a large working area on the floor around the pit. The work is brought to a good level for convenience in cutting, and where long strips are to be cut, the large floor area is desirable. The tiresome stooping to the floor is avoided, a feature which appeals to the man on the job.—Lee M. Delzell, Maroa, Ill.

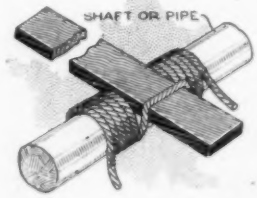
Inserting Bushings in Motorcycle Connecting Rods

An easy method of inserting bushings in connecting rods of motorcycle engines is to pass a machine bolt of sufficient size and length through the bushing and connecting rod, as shown. Run the thread up to within 1 in. of the head. Place a 3/8-in. washer on the bolt next to the head. Put the bolt through the bushing and connecting rod. Then put a large washer next to the connecting rod. Put a nut on the bolt and draw it up, until it pulls the bearing into place, and without marring the bearing surfaces.—Walter B. Raynor, Patchogue, N. Y.



Pipe Wrench Made from Rope and Wooden Strip

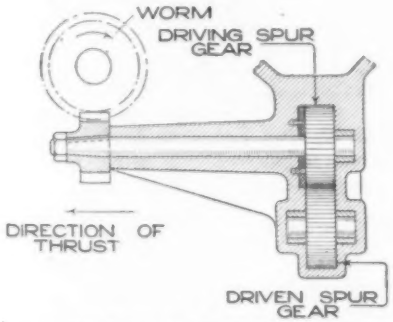
When a pipe wrench is needed for turning or holding pipe, and none is at hand, a substitute can be made of a wooden strip and a piece of rope. Lay the strip across the pipe as shown, and wind the rope around the pipe and over the strip, so that the latter acts as a lever. The rope should, of course, be fastened so that the pull is in the desired direction.—C. M. Hall, St. Louis, Missouri.



Bronze Disk Takes Up Thrust Wear in Pump

The oil pump of a gasoline engine revealed a gradual drop in pumping capacity and an examination showed that the driven spur gear was subjected to a great longitudinal thrust due to the action of the driving worm. This thrust resulted in the inner wall of the pump case becoming worn, allowing the oil to leak past the gear teeth so that the pump lost a great amount of its pumping force.

A repair was necessary and it was accomplished in the following manner: The pump was dismantled and found to be worn out in the casing wall to a depth of 1/16 in. A hole equal in diameter to the outside diameter of the gear and 1/4 in. deep, was bored in the casing on the side subjected to the thrust, and a bronze disk inserted in the hole. This was held in position by two 1/4-in. headless machine screws.



The Cavity Worn in the Casing was Filled by a Bronze Bearing Plate

The disk acted as a sort of thrust plate and instantly brought the pump up to its normal pumping capacity. A new disk replaced the worn one from time to time, so that the least bit of wear was quickly counteracted.

House Moved over Snow with Makeshift Capstan

On a house-moving job here recently, the movers rigged out a capstan that did the work in first-rate shape, and as will be seen from the photographs it was quite crude as compared with the usual capstan for this purpose. A fork of a tree was strongly braced to a heavy timber foundation, and a vertical drum for the capstan was mounted in it. This made a more convenient arrangement than the usual support of two or four upright pieces braced together. The building was moved nearly one-half mile in 40 hours, over very rough and hilly ground, by two men with the aid of one team.—W. E. Covert, Grande Prairie, Alta., Canada.

The Building was Moved Nearly One-Half Mile over Rough Ground by the Use of This Makeshift Capstan Built of a Large Tree Fork

Runway over Oil Tanks Saves Lifting of Barrels

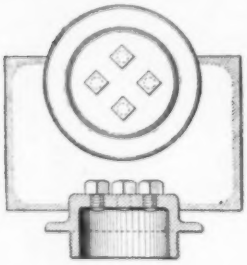
Shops using several grades of oil will find it convenient to build a runway or track above their oil-storage tanks, as shown in the photograph. When it is necessary to renew the storage supply,

The Barrels or Drums are Rolled into Position and the Contents Transferred

the barrels, or drums, in which the oil is shipped, are rolled up an incline to the track, and thence along the track to the tank to be filled. A saving of many hours of labor resulted from the adoption of this plan in a large shop, as compared with the pump or dipping method of filling the tanks.—K. M. C., Webster Groves, Mo.

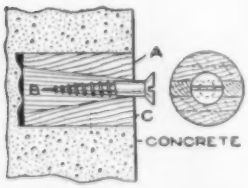
Square Wrench Seat Fitted on Tank Filler Cap

The filler cap on the gasoline tank of an automobile was of circular shape, and was extremely hard to remove when it was necessary to refill the tank. I decided to improve it in some manner so that a wrench could be used. I took four square-headed machine screws and set them in the top of the cap, as shown in the illustration. The wrench could then be applied with ease, and the cap was quickly removed.—Adolph Klein, New York, N. Y.



Wooden Expansion Plugs for Screws Easily Made

A wooden expansion plug for holding a screw or bolt in a concrete wall may be made quickly, as shown in the sketch. A round wooden 1-in. plug is sawed diagonally, so that the cross section will show three parts, A, B, and C. The plug is placed in the drilled hole in the wall, and the screw started in the wedge end of B, expanding it tightly against the other sections. The wedge tends to press A and C more tightly against the walls of the hole under an outward pressure. The plugs are best uniformly machine cut.

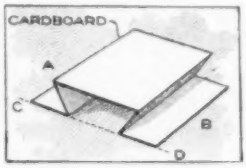


Old Paintbrushes Provide Small Tool Handles

When paintbrushes become worn out they are usually thrown away or burned. By saving the handles of these brushes, especially those of the heavier round type, the home mechanic can keep his tool box well stocked with extra handles for small files and other tools. The brush handle can be quickly trimmed to shape with a jackknife, and the end cut for a ferrule, flattened to an oval if necessary.—Frank Jablecnik, Chicago, Ill.

Printing-Press Gauge Pins Made of Paper

Printers, when doing work with narrow margins, often find that the gauge pins they commonly use are in the way of the grippers. Instead of using a regular-style gauge pin, a homemade substitute, which is perhaps better since it can be flattened out by the tympan clamps with each impression without doing it any harm, can be used. It is made from a piece of light cardboard, or stiff paper. The paper is folded, as shown, and the ends A and B are pasted at C and D, along the line where the paper will be fed.—Joseph Thalheimer, Jr., Venice, Calif.

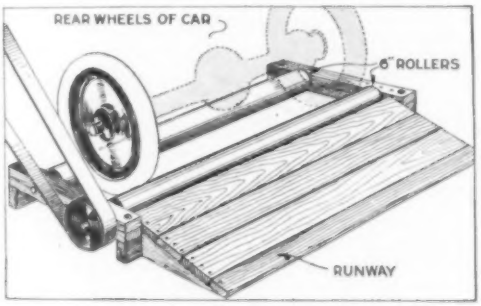


Auto Used as Power Plant without Altering Car

An automobile may be utilized to furnish power for operating small machinery without altering the car in any way, by the use of the driving rigging shown. All that is necessary is to back the automobile up the slight incline, and leave the gears in mesh with the engine running. The tires transmit the power to the 6-in. rollers, and they, in turn, to a belted drive pulley. The wooden rollers are 6 ft. long. Each end is fitted with an axle, 1 ft. long, suf-

ficiently heavy to bear the weight of the automobile used. Two wooden bearing boxes are built of 3-ft. pieces of 2 by 4-in. hard pine, bolted together and bored through the middle, for bearings, where the two faces come together. Small holes are also bored down through the top piece for lubrication. The rollers are assembled with ring washers against their ends, and the bearing boxes are bolted together with two braces. The pulley on the projecting end of the driving axle is set with a setscrew.

A slanting platform, as shown, makes it easy to back up the car on the rollers. The distance between the rollers depends on the diameter of the wheel of the car being used, but for general purposes a space of 18 in. between the two sets of bearings will give ample

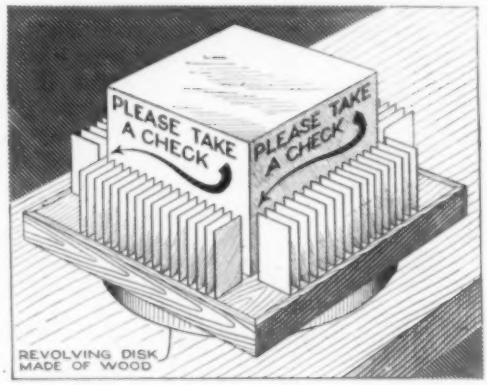


The Rear Wheels of the Automobile are Run onto the Rollers, and Transmit Power to the Drive Pulley

room for the average auto wheel to come well down between the rollers and insure good traction.

Revolving Check Holder for Lunch Rooms

Instead of having a person at the door to hand out checks during the busy hours, a lunch room uses several holders of a type shown in the sketch. They are filled by the cashier during the part of the day when the patronage is light. As the patrons enter they pick their own checks from the holder, the arrow indicating which end the check should be taken from. The cardboard box in the center, on which the directions are marked, is lifted off, and the rack for the tickets replaced as required. The rack is pivoted on the

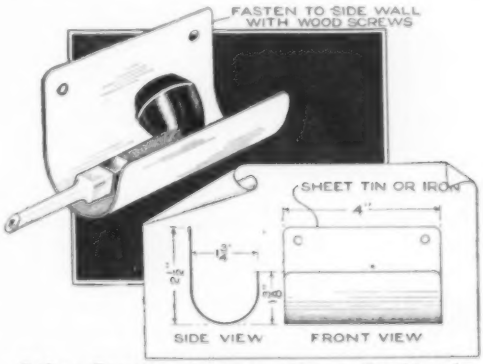


The Patrons Take Their Checks from the Holder Which is Provided with a Filled Rack as New Checks are Needed

center of the wooden base with a bolt. —L. E. Turner, Brighton, Mass.

Racks for Pipes and Cigars Aid "No Smoking" Enforcement

Considerable trouble was experienced in a large factory where smoking was forbidden in certain of the departments, because lighted cigars, pipes, and cigarettes were carried by persons entering the room to remain only a short time. As a result, racks made of sheet metal, as shown, were provided at the doors, and a suitable sign placed over them. The rule against carrying

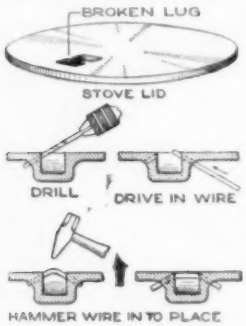


Before Entering the Room Where Smoking is Forbidden, the "Smoke" is Placed on a Rack at the Door

lighted tobacco in various forms was rigidly enforced and hearty coöperation of the men was gained.

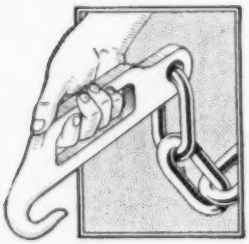
Stove-Lid Lifting Lug Repaired with Wire

A neat repair was made when the cast lug on a stove lid broke, by setting a piece of wire across the lifter socket, by the method shown in the illustration. The hole was chipped clear, and holes for the wire were drilled through the sides, at a slight angle, as indicated. The wire was driven through from below, cut off to the proper length, and hammered into place. The bend which the wire must be given to fit into the holes, can be determined easily by a test, the wire being bent with the aid of pliers.—Edwin J. Bachman, Jr., Fullerton, Pa.



A Pulling Hook with Safety Finger Hold

Where hooks of the ordinary design are used on the end of a chain, or line, for pulling objects around by power, on cranes, etc., accidents occur frequently. The man whose work it is to engage the tackle may try to place the hook in the hole, or fitting, "on the fly," and smashed fingers may result. The safety-first hook shown has a finger hole whereby it may be held without danger. The proportions of such a hook will vary in accordance with the work to be handled. The size of the finger opening should be about 1½ by 4 in. Where the service is not too severe, these hooks may be cut and forged from sheet-steel plate.—E. D. Clifford, Chicago, Ill.

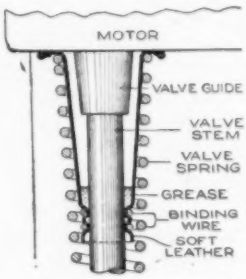


Handy One-Man Method of Using Tapeline

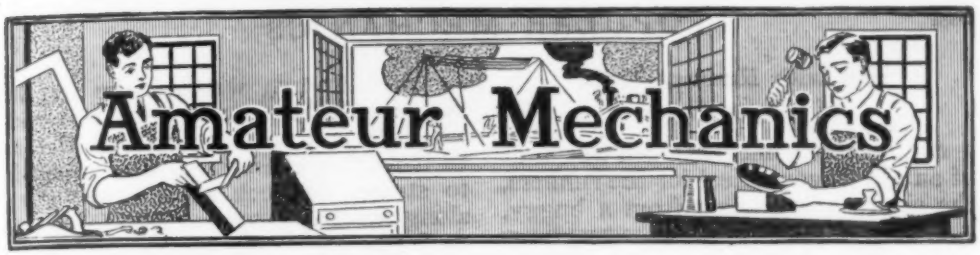
If proper care is taken, measurements can be made with a tapeline by one man with as much accuracy as if an assistant were setting the end of the line. A 6-in. brad awl is set carefully at the mark from which the measurements are made, the point passing through the end loop of the tapeline. While the device is especially useful on wooden structures, it can also be used handily on brickwork, by making the measurements from wooden trimmings, and deducting the lengths which are not to be included in the measurements.

Leather Cap Remedies Loose Auto-Engine Valve

When the valve guide and valve stem became worn on an automobile engine, an extra amount of air was sucked in, weakening the mixture coming through the carburetor, thereby causing much trouble. To eliminate this, I shaped a piece of soft leather to fit on the inside of the valve spring. I put a piece of wire around the top to stiffen it and attached the cap to the valve stem at its lowest point of motion. Grease was added, as shown, acting as a lubricant and aiding in keeping out the air. The device is held in place by the pressure of the valve spring, and the leather, being soft, allows for the movement of the valve.—A. Elting, New York, N. Y.



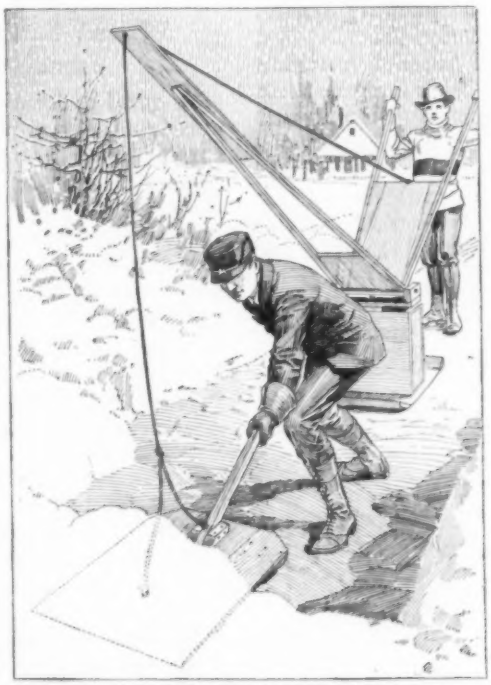
¶When drilling holes in small pieces of metal, especially where a brace or breast drill is used, and no vise is at hand, hold the piece with a monkey wrench, so as not to harm the hands, or weight the wrench, if both hands are needed for drilling.



A Two-Man Snow Shovel for Heavy Snowfalls

By R. S. EDWARDS

WHEN three feet of snow fell in as many days, we found it difficult to keep a reasonably wide path cleared from the house to the roadway, to say nothing of paths to the other buildings, and along the main sidewalk. Ordinary snow shovels were inadequate, so we built a two-man—or rather two-boy—shovel that did the work in a hurry. The making of this interesting outfit also was fun. It operates like a derrick. The man at the shovel takes on a load of snow, and his partner raises the load, and pivots the upper part of the outfit to one side, so that the load can be dumped easily.



In a Very Heavy Snowfall, When Ordinary Snow Shovels Proved Inadequate, This Novel Two-Man Outfit was Built to Handle Large Loads Quickly

The construction is simple, and the materials used can be obtained easily, or substitutes devised. The runner is a flat piece of board, curved at the ends, and braced with two cleats. A wooden box is nailed to the runner, as shown. A pivot block is fastened on top of it, at the middle, and a bolt is fitted through the block and the lower strip of the pivot frame. On the ends of this strip are blocks through which an axle is set, to provide for the vertical motion of the derrick feature. The latter is built up of strips, strongly braced with boards, cleated together. A strong rope is fastened to the two sections of the derrick feature, as shown, and then connected to the shovel proper by a two-cord yoke. This is set in line with the shovel handle, so as to make it easy to tip the load, without interference.

Filing Popular Mechanics Magazine Compactly

To economize space in filing away my copies of Popular Mechanics Magazine, I first remove both front and back covers with a knife, leaving the back intact. I remove the index and advertising sections carefully, and hammer down the staples. Next I paste the index on, and cover the back edges over the staples, with a pasted strip of paper. A uniform style of title, indicating the month and year of issue, is put on the back. I cut out the advertisements I want to preserve, and file them.—W. J. Parks, La Salle, Illinois.

Sled with Runners Made of Wagon Wheel

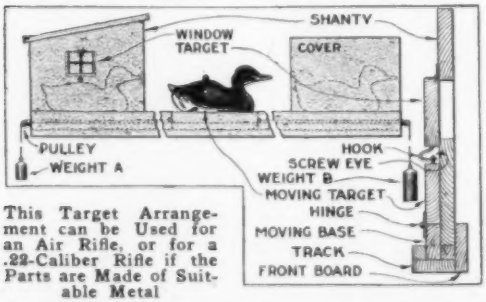
An unusual homemade sled was built of an old wagon wheel for the runners, the shafts being taken from a buggy,

This Novel Sled was Made Largely of an Old Wagon Wheel and Packing Boxes

and the seat made of packing boxes. The runners are merely the tire and rim, and the spokes are the uprights supporting the bed. This construction was made possible by straightening out the wheel rim, and setting it up, one-half for each runner. The sled takes the place of one that would be rather costly and is quite serviceable, as the photograph shows.—M. W. Behrmann, Fairfield, Wash.

Moving Target for Practice with Air Rifle

An interesting device, which a boy can make, and which will give him good practice with an air rifle, is a mov-

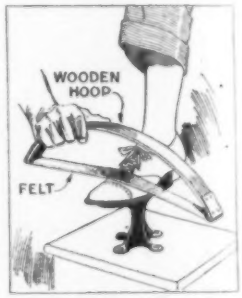


This Target Arrangement can be Used for an Air Rifle, or for a .22-Caliber Rifle if the Parts are Made of Suitable Metal

ing target, arranged as shown. The duck is fastened behind the shanty and held in place lightly by a hook, as defailed in the sectional diagram. The window target is hinged at the top and when struck folds back, releasing the duck. The base of the duck is attached to two weights, the weight A being lighter, and when released, the duck is drawn along the track until it reaches the cover. The object is to strike the duck as it is traveling along the track, causing it to fold back on its hinge. Other cords can be arranged easily so that the duck can be raised when folded back, and the heavier weight lifted by the marksman from a distance, so that the duck will be drawn back to its place in the shanty. If the hook on the window target is properly bent, it will drop into the screw eye at the top of the duck when the latter is drawn back behind the shanty.—G. P. Lehmann, Brooklyn, N. Y.

Flannel Shoe Polisher Made from Barrel Hoop

A good method of obtaining a high polish on shoes is to rub the leather surface with a strip of cloth, such as felt or flannel. A convenient means of polishing the shoes with such material is to cut a small section of a wooden hoop so that the span across the arc is about 18 in., and secure a strip of felt or flannel, 3 by 20 in. long, to it, as shown. By grasping the hoop as a handle and moving the strip of cloth over the shoes, an excellent polish will result, with minimum labor and little soiling of the hands.



Tightening Rims on Shell Nose-Glass Frames

In extremely hot or cold weather, or under rapid changes of temperature, lenses in nose glasses and spectacles, having shell, celluloid, or similar frames, frequently become loosened and in danger of falling out. This is usually due to the variance in the ex-

pansion or contraction of the glass and the rim. The remedy lies in fitting the loose parts together, and shrinking or expanding them to a closer fit. In cold weather the rim is likely to contract more than the lens, sometimes snapping off, if left near a window. The glasses should, therefore, not be exposed to extreme cold. In very hot weather the rim expands more than the lens, permitting the lens to fall out. The lens can be replaced by manipulating it and the frame in warm water. When removed from the water, the rim will shrink, holding the lens securely.—C. P., Chicago, Ill.

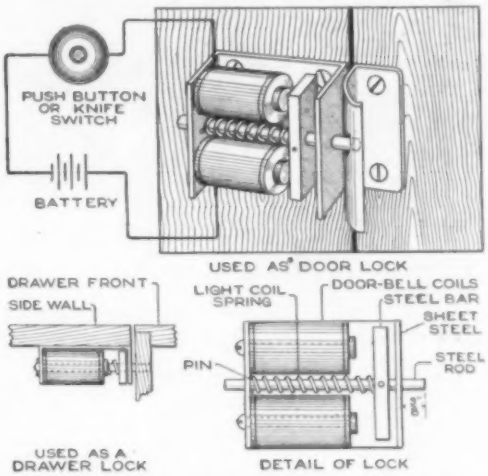
Large Canteen Tipped Handily When Suspended from Tree

Campers in the mountains of southern California usually keep water cool for camp use by hanging a two or three-gallon evaporation-cooled canteen in a tree. The canteens are somewhat difficult for the women in the camp to handle. A method that was improvised on a recent trip, and which proved popular, judging from the smile of the fair user, is shown in the photograph. The filled canteen is hung up by its carrying strap, so that it swings 2 ft. clear of the trunk of the tree from which it is supported. A stout cord is tied to the bottom lugs of the canteen and strung over a hook set in the trunk of the tree above the can. It is only necessary to draw on the cord to pour the water easily.—John E. Hogg, Alhambra, Calif.

¶Flowers and decorations, cut from good-quality crêpe-paper napkins, make neat ornaments for place cards, programs, etc., when pasted on white cards.

An Electric Bolt Lock Made from Bell Ringer

An interesting piece of construction that the amateur will find useful is a bolt lock for drawer or door operated



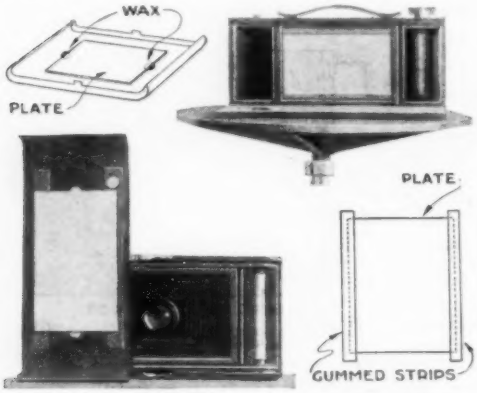
Details of the Electric Bolt Lock, and Methods of Installing It on a Drawer and a Door

from a distance. It can be made easily from an old bell-ringing magnet. The magnet is mounted on a strip of sheet metal, bent into a U-shape, and the steel rod for the lock bolt is mounted in the end of this piece. It is free to slide within limits set by a pin near one end and a steel bar fastened to it near the other end. The steel bar is held in place, in its locked position, by a light coil spring. When the push button, or knife switch, set in the circuit, is closed, the steel bar is drawn against the magnet coils, opening the lock. On the cutting of the circuit, the spring forces the lock into its closed position.

Using Plates in a Film Camera

Those owners of film cameras who often wish to proceed with the developing and printing of an exposure without an indefinite wait for the remainder of the roll of film to be exposed, will appreciate the following suggestions. The use of a plate solves the difficulty. A plate may be fastened in a film camera by the simple methods indicated The operations are, of course, con-

ducted in the dark room, under red-light illumination, and the camera is empty of film. If the camera has a detachable back that clamps on, then



By the Use of These Simple Schemes, Single Exposures may be Made in Cameras Usually Requiring Roll Films

two pellets of beeswax may be stuck against the inside surface of the back, and a photographic plate may be pressed firmly against them. The back may then be clamped into position, the exposure made, and the plate removed and developed.

If the back slides in guides, the plate may be held in the rectangular opening in the back of the camera, using gummed binding strips. Prepare a plate as indicated, then stick two binding strips upon the back of the plate, allowing half the width of the strips to project beyond the edge of the glass. After moistening the projecting gummed surfaces, fit the plate into the rectangular opening at the back of the camera, and press the sticky surfaces down firmly upon the frame. Slide the cover into place, make the exposure, and then free the plate for the developing process. A number of plates may be equipped with the strips and stored in a box for ready use.—L. Pyle, St. Louis, Mo.

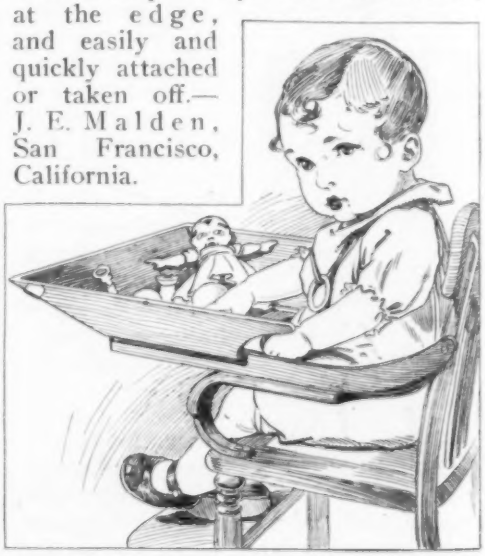
Waterproofing Canvas with Paraffin

A handy method of waterproofing canvas is as follows: Melt 1 lb. paraffin in a dish. Remove the melted paraffin a safe distance from the fire, and pour it into a gallon of gasoline. Stir the gasoline as the paraffin is put in so that it will mix well, and keep the gasoline as well as the mixture away from the fire. The heating should be done out of doors.

Hang the material to be waterproofed over a line. With a clean paintbrush, apply the liquid like paint. The gasoline carries the paraffin into the fabric. In a few hours the gasoline will have evaporated, leaving the canvas smooth, clean, and flexible. After being treated in this manner, the canvas will be insured against mildew, as well as being impervious to water.—Joseph T. Sproule, Watkins, N. Y.

Guard Keeps Baby's Playthings on High Chair

Baby, with his small and mischievous hands, often drops playthings from the table of the high chair to the floor, keeping his fond parents busy picking them up. To prevent this I built a slanting guard around the high-chair table. This also keeps baby's toys within reach, for they slide back down the inclined edge, should they be thrust out of reach. Basswood, 1/4 in. thick, was used to build this guard. It is held in place by four small hooks, at the edge, and easily and quickly attached or taken off.—J. E. Malden, San Francisco, California.



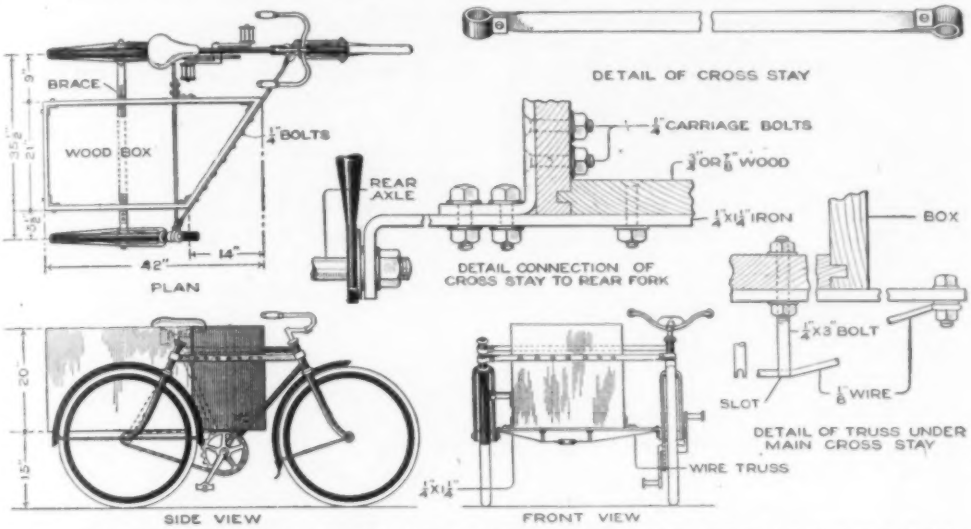
This Guard for the High Chair Keeps Baby's Toys within Reach

Sidecar for a Parcel-Delivery Bicycle

By P. P. AVERY

QUICK delivery of small packages within a two-mile radius can be accomplished with a bicycle by a sturdy boy. An ordinary bicycle is used, preferably one with coaster brake and mudguards. Iron braces, ¼ by 1¼ in., are shaped to make the framework, and the ends are looped to fasten around the frame of the bicycle and the supporting fork of the third wheel. This wheel is a bicycle front wheel with a fork. A mudguard on the third wheel is desirable. Make the iron parts as detailed, and fasten them into place. The body is made of ⅞-in. wood, preferably oak. The upper portion of the body is cut to receive the top brace, which is not in the way in loading or unloading the packages. Fasten the box with ¼-in. carriage bolts, using a spring washer under the nut wherever a joint is made between wood and iron. A canvas cover can be cut to fit the top and secured at one end only, with three catch knobs on the sides and corresponding eyelets in the canvas, keeping the dust and rain from the interior of the body.

It is a good plan to stiffen the body with corner braces, using ⅛ by ¾-in. band iron. The floor of the body should be strongly fastened, tongue-and-groove boards being used, and the side corners should be fitted with iron braces at the bottom. The body may be extended farther over the rear, if more loading space is required.



An Ordinary Strong Bicycle can be Made into a Substantial Delivery Car by the Addition of a Body and a Third Wheel

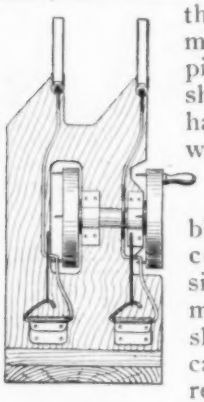
One coat of priming and one of paint finishes the box, and with the name of the merchant on the front and rear, the whole makes a neat advertising feature. Regarding the selection of a bicycle, since great speed is not essential, the lower the gearing is, the easier it will be to propel the load, and for ordinary work, where only small grades are covered, a gear of about 65 will be found efficient.

Handy Use for Adhesive Tape

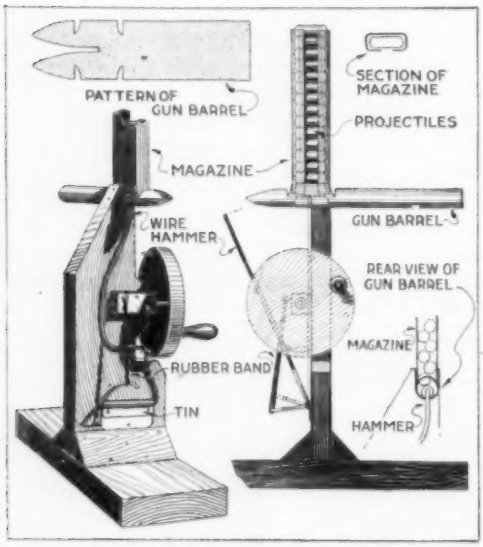
Adhesive tape is useful in the shop and for the home mechanic, for many purposes: to mend broken handles temporarily; to bind up a cut finger; to prevent a hammer or ax handle from slipping in the hands, by applying tape around the handle; for making a ferrule for an awl, chisel, etc.; around the nail set it will keep that tool from jarring the hand; around a lead pencil in the vest pocket as a guard.

A Toy Machine Gun That Fires Wooden Bullets

For use in the mimic battles which most boys like to stage in this war time, an interesting mechanical toy that a boy can easily make of materials picked up in the workshop, is a machine gun having a magazine for wooden bullets, and which can be made as a single or a double-barrel gun. The construction of the single-barrel arrangement is detailed in the sketch and the modification for a double-barrel gun is shown in the smaller diagram. It is a duplicate of the first type, suitably mounted as shown. The gun is fired by turning the crank on the wheel and the bullets can be quickly replaced in the magazine at the top.



The support for the gun is made of wood and braced strongly at the base. The gun proper is set into the top of the vertical piece, as shown, and the magazine, which is bent from a piece of tin to the shape detailed in the sectional view, fits on top of the breach of the gun. The hammer, which drives the bullets, is made of a piece of stiff wire bent to the shape shown. The lower curved end is connected to a small nail set on a block at the shaft of the wheel. To fire the gun, the hammer is drawn back by contact with the small nails set into the side of the wheel. As the wheel is turned, the nails grip the hammer and then suddenly release it, driving out the lowest bullet each time. The bullets are piled in the magazine, as shown in the detailed view at the right, where the rear view of the gun barrel is indicated. —Edward R. Smith, Walla Walla, Washington.



The Machine Gun is Fired by Turning the Crank at the Wheel, the Pins on the Latter Drawing Back the Hammer, Which is Hooked Up with a Rubber Band

Using Plate Holder as Printing Frame

A cumbersome part of a commercial photographer's equipment when "on the road" is his set of printing frames. Amateur photographers who have cameras using plates of more than one size find these frames an expensive part of their outfits. A method that is practical and inexpensive for these requirements in many cases, is as follows: Place the sensitized paper in the plate holder with the emulsion side up. Then put the plate in the holder in the same way as if about to expose it in a camera, but with the emulsion side down, so that the sensitized side of the paper and the emulsion side of the plate are in contact. The paper and plate are thus held in close contact without the use of springs, as in the regular printing frames. The plate and paper can be removed by pressing the spring catch at the bottom of the holder, and the plate is not easily moved while in place.—Francis W. Clinton, Brooklyn, New York.

¶ Leaks in garden hose may be repaired by wrapping several layers of adhesive tape over the break, lapping the edges carefully.

Wire Clips Weight Paper in Typewriter

Three wire paper clips linked together make a good weight for typewriter sheets that keep rolling or blowing back over the carriage, into the operator's way, in a breezy office or where a fan is not properly stationed. They may be quickly applied to the end of the sheet, or batch of paper and carbon sheets, and removed as easily, saving time and annoyance.—H. P. Roy, Kansas City, Mo.

Chain Weight Prevents Whipping of Flag

A length of chain, sewed into a hem at the lower edge of a flag makes an inconspicuous and effective weight to prevent whipping of a flag suspended from a horizontal staff. A piece of cord can be threaded through the links of a chain to prevent it from rattling, if necessary.

Poultry-Fence Construction Economical of Netting

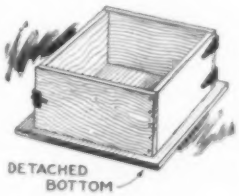
Not wanting to put a high poultry netting on my fence to keep my poultry at home, I devised the method shown, and was thus enabled to use 24-in. wire instead of 48-in., thereby effecting a saving, as well as not marring the appearance of the fence. Chickens will not attempt to fly over this wire but once or twice, as they endeavor to alight on the pickets of the fence instead of the wire, and consequently are thrown back by striking the wire. The wire should be supported at each post, as shown in the sketch.—Roy H. Poston, Flat River, Mo.

A Fort Built of Snow Blocks Made in Box Form

What boy does not enjoy a regular snowball fight—a battle, in fact—especially when he has a fort of his own

The Making of the Snow-Block Fort Is Nearly as Much Fun as Daring the Enemy to Come and Capture It or Capturing the Enemy's Barricade

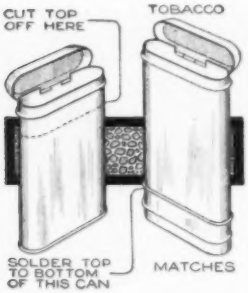
building to defend, and his friends have one which he wants to capture? A way to build a snow fort that will not crumble easily when the enemy charges it is to pack the snow into a box form and build the structure of the snow blocks, as shown in the photograph. Portholes can be provided and when the snow melts slightly, and freezes again, a very solid wall results. The form for the block, as detailed in the sketch, is made of a box, arranged so that it is hinged at one corner and has a catch at the corner diagonally opposite. The form is set on a wooden board and when the snow is packed in solidly, the catch is opened and the form lifted away from the block. It is then carried into position and another block made on the same board. Several boards are handy in making the block quickly.—H. S., Chicago, Ill.



¶ In applying varnish over an old wood surface, or on new wood that has become soiled, care should be taken to remove all traces of oil or grease with benzine.

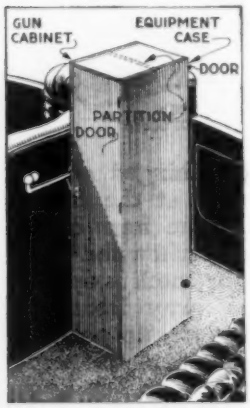
Match Safe Soldered to Pocket Tobacco Can

A homemade tobacco can and match holder for the pocket, which has proved handy, was made in a few minutes, as shown in the sketch. An ordinary tobacco can, of the kind that fits the pocket nicely, was cut off at the top about an inch below the cover. This portion was then soldered to the lower end of a similar can, and the cover at this end was fitted tightly by making several center punch marks into the edge. Matches are kept in the small end and tobacco in the larger end.—O. S. Billings, Ruskin, Fla.



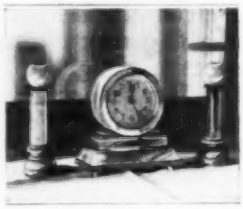
Sportsman's Gun and Equipment Cabinet for Automobile

The sportsman who makes it a custom to load his guns and outfit into his automobile for occasional trips knows that he is likely to forget some of the hundred and one articles needed, to say nothing of the inconvenience of handling the various objects. To avoid this I built a cabinet in which I keep my hunting paraphernalia packed compactly and safely for auto transportation. The cabinet, as shown in the illustration, fits into the rear compartment of the machine, and is supported from the robe rail by straps. It is built of pine boards, and is 14 in. wide, 16 in. deep, and 50 in. high. It is divided into two equal compartments by a partition, one side being the gun cabinet and the other the equipment case. The guns are strapped into racks and the equipment is packed in convenient drawers and pockets. The full-length doors are provided with locks and set flush with the edges, making a cabinet that is flat and smooth on all sides.—F. E. Brimmer, Dalton, New York.



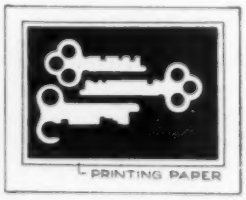
Clock Case and Electroliers Made of Marble and Onyx

As a pastime for spare moments, my father made the clock case and electroliers shown in the photograph from bits of onyx and marble. All the work was done by hand, with the exception of the round portions, which were turned in a lathe and then polished. The polishing was finished by hand and the various parts, such as the bases, shafts, etc., were cemented together. The centers of the electroliers were bored out 5/8 in. and fitted with small electric-light bulbs, giving a translucent effect when the light is on. —Howard Scott, Jersey City, N. J.



Photographic Prints of Keys Handy for Making Duplicates

Being in possession of only one set of keys for the safe and cash register, I thought it would be a good plan to have a perfect imprint of the keys, so that new ones could be replaced with the least trouble in case any keys were lost. The process is simple: Make a print on photographic paper, using the keys as a negative; place the side of the key which has the sharpest edge in contact with the



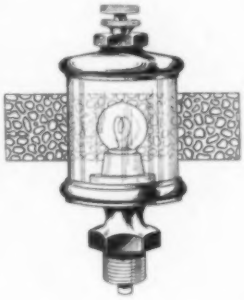
paper, and use a rather soft pad to force the paper into contact with every part of the edge. Develop and fix the print as usual. To make a duplicate key, cut out the pattern, place it in the vise with the key blank, and file the notches, following the pattern carefully.—A. J. Viken, Waterloo, Iowa.

Spring Relieves Hands of Sidecar Motorcycle Driver

Steering a motorcycle equipped with a sidecar is, at best, a tiresome task, which takes a good deal of pleasure from this sport. Such a machine has a tendency to steer toward the sidecar, and, as a result, there is constant strain on the wrists of the driver while driving straight ahead. An effective way to overcome this is to attach a ½-in. screen-door spring to the handlebar, opposite the sidecar, and to the horizontal bar of the frame. The tension of the spring can be adjusted to counteract exactly the inward pull of the sidecar, relieving the driver of undue strain on his wrists, and giving him greater freedom and safety.

Glass Oilcup Used as Electric Mast Light

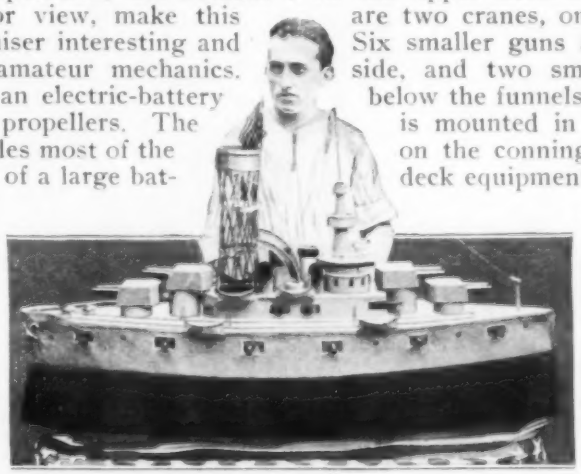
Wanting a small top light for decoration on the top of a mast flagpole on a launch, I found an oilcup that had been used for a stationary engine and rigged it up as a fixture for the light. I cleaned and polished the oil cup, and cut out the center pipe, which was used for the oil flow, and placed a small electric light receptacle in the bottom. The wires from the battery were run through the bottom hole to the receptacle connections. By sealing the oilcup, it was made weatherproof.—P. D. Baker, San Francisco, Calif.



¶ A triangle placed under tracing cloth when making an ink erasure, will prevent the cloth from buckling.

Model Battle Cruiser Built by Boy

Numerous features of construction and automatic operation, not evident from an exterior view, make this model battle cruiser interesting and suggestive for amateur mechanics. It is driven by an electric-battery motor and twin propellers. The equipment includes most of the common fittings of a large battleship, above decks. The guns in the turrets have mechanical controls, and can be turned sidewise as well as vertically. At the stern of the ship, back of the second turret, are two torpedo tubes. On the upper deck near the funnels are two cranes, one on each side. Six smaller guns are set on each side, and two smaller guns just below the funnels. An aerial gun is mounted in the crow's nest on the conning tower. Other deck equipment is two anchors operated by chains on capstans, and eight lifeboats. The length of the craft is 47 in., width 16 in., and height 26 in. It weighs 44 lb. without the sand ballast. The

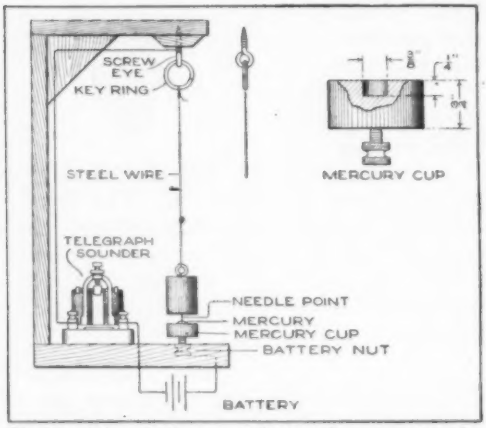


This Electrically Driven, Twin-Propeller Model Battle Cruiser was Equipped by Its Boy Builder with Many of the Features of a Genuine Cruiser, Including Torpedo Tubes

draft is 7 in. when in ballast. The hull was made of tinned sheet metal and the frame of maple and cypress.—Ralph Dengler, Lebanon, Pa.

An Electric Time Pendulum for Experimental Work

Many experimenters find much use for a device that will beat the time in seconds, or fractions of a second, in



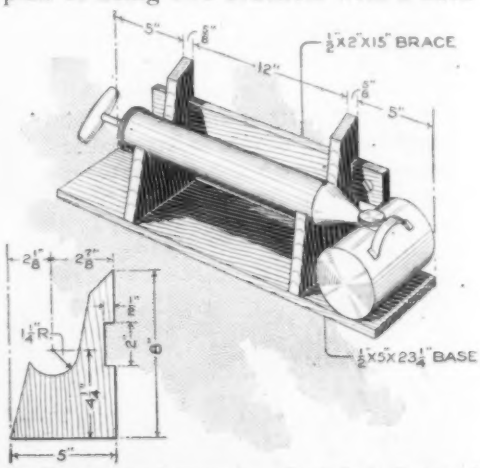
The Pendulum Swings and Makes Contact with the Mercury, Completing an Electrical Circuit and Operating a Buzzer

experiments involving the element of time. For this purpose, an arrangement in which use is made of the swinging of a pendulum was found satisfactory. The materials required to make the apparatus are possessed by most experimenters. The cup to hold mercury, as detailed, was made by cutting off the end of an old dry-cell carbon, and drilling a hole in it. The bob need not be of lead, or of the size specified. The heavier and bigger the bob, however, the longer the pendulum will swing when once started. A good bob was made by drilling a 1½-in. hole, 2 in. deep, into a block of wood. In the center of this hole a needle was set, and around it, sand to a thickness of ½ in. Melted lead was poured into this hole, and while the lead was still in a liquid state, a screw eye was fixed in it. The steel wire was of the size used for the E-string of a mandolin. The length of this wire is determined from the formula for the period of a simple pendulum, and for one swing in one second is 3.26 feet.

In assembling the instrument the pendulum is suspended to swing freely. The cup is to be mounted on a board directly below it, setting it about two-thirds of the way into the nut. When it is in this position, and the pendulum is set to swinging, the needle should make contact with the mercury, causing the sounder to tick. Adjustment is made at the nut, suitable electrical connections being made as indicated. —C. S. Cierpik, Chicago, Ill.

Rack Protects Sprayer Used in Barn

To provide a safe and convenient place for the hand sprayer, which was employed frequently in the stable and barn for spraying horses and cattle, I made the rack shown in the sketch. It has more than paid for itself in the saving of time, as the sprayer is always in place, and in the cost of new sprayers. The rack should be made of a size suited to the sprayer used, and the dimensions given are suggestive only. The construction should also be varied to suit special needs, but the general plan of using two brackets with a back



By Keeping the Sprayer in a Rack It is Protected from Undue Wear and Denting, and Is Always at Hand When Wanted

and bottom piece will usually be found suitable.—T. H. Linthicum, Annapolis, Maryland.

Suspended Twine Holder Made from Funnel

A handy container for a bundle of twine, used in tying parcels, is a funnel suspended by its upper edge from the wall or ceiling. Three strings or wires are attached to the rim of the funnel and brought together into one cord, by which it is suspended. The drawstring of the ball of twine is drawn from the small end of the funnel.—Abel Greenstein, New York, N. Y.

Rustic Table with Polished Top Crosscut from Log

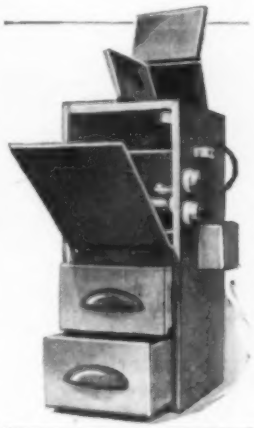
A workman watching the felling of a large maple tree, and noticing that the wood was sound to the core, obtained a slice of the butt, 2 in. thick, and made it into an unusual top for a rustic table. He smoothed off the slab with a plane, on both sides, and finished one side very carefully, to serve as the top. He fitted it with rustic legs, and worked the top to a piano finish, showing off the beautiful annual rings to advantage. The other parts were varnished, the bark being smoothed only slightly.—Dale R. Van Horn, Milton, Wis.

Boiling Eggs in Steam

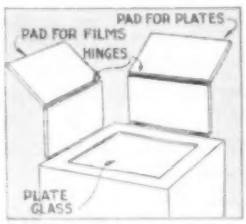
Boiling eggs in steam not only saves time but is also economical. Use only enough water to cover the surface of the pan thoroughly; about 1/8 in. deep is sufficient. This small quantity will boil in a few seconds, and when boiling, place the eggs in the pan and cover with a close-fitting lid. The eggs will be cooked, or boiled, in steam, without the necessity of heating a large quantity of water.—F. Ball Pinkus, La Crescenta, Calif.

A Compact Electric Photograph-Printing Machine

An electric photograph-printing machine which practically does away with a dark room is a great convenience to the amateur photographer. The two lower drawers, as shown in the illustration, are large enough to hold the materials necessary, and the cabinet is built the height of an ordinary table, so that the operator can be seated, and work conveniently. The top is fitted with a sheet of clear plate glass, 10 in. square. Hinged to the back and one side of the top, are two felted pads. The rear one is raised a trifle to allow for printing plates, the one on the side being used for films.

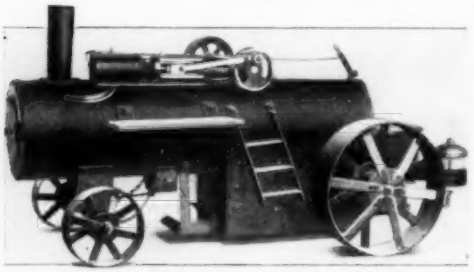


A sheet of ground, or opal, glass, for diffusing the light, is inserted 5 in. below the glass top. Halfway down the front of the box is a light shelf, and to the front of it, a spring-hinged door, which closes the entire upper compartment. Wire the space under the opal glass for five electric light sockets, four for 25-watt lamps, and one for a ruby light, not over 8 cp. The two switches on the side are for the ruby and white lights, which work independently of each other. The wooden pocket, under the switches, holds the paper while printing. Build the two drawers to fit the bottom compartment. The upper one is fitted with partitions.—L. B. Robbins, Attleboro, Massachusetts.



Model Steam Tractor Made by Boy

Boys, and others who like to make models, may be interested in a small steam tractor I designed and built of

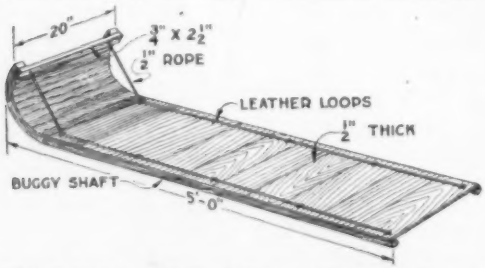


This Model Steam Tractor Is 28 Inches Long and Drives Itself, Wood and Coal being Used as Fuel

scrap materials around the farm shop. I used only the ordinary tools on hand in such a place. The steam engine and tractor run smoothly, and the engine propels the tractor just like a large machine of this kind. The tractor is 28 in. long and 14 in. high, and the boiler holds 1¼ gal. The bore of the cylinder is ⅞ in. and its stroke 1¾ in. It was made from an old iron window weight. I use wood and coal to fire the boiler, and steam can be got up in a few minutes.—Albert H. Bennington, Park River, N. D.

Toboggan Made of Old Buggy Shafts

A method of making a strong toboggan sled by nailing a suitable bottom



This Toboggan with Stout Runners Made from Buggy Shafts can be Used like One of the Ordinary Type, but Works Best on Frozen Snow

over sections cut from old buggy shafts, as shown in the sketch, can be adapted easily for use with poles of about the same size. They can be steamed and bent at the ends and the construction otherwise made as shown. The shafts were cut to the length indicated, the curved front end being sawed off. The bottom was carried up around the curved rear end, and a strong bracing strip was bolted across them. One-half-inch rope with leather loops provided handholds, and was also used as a brace at each side of the front of the sled. Twisted wire may also be used for this purpose. Cushions of the usual type can easily be made for the toboggan.

Bicycles Driven as Three-Wheel Tandem after Breakdown

On a bicycle trip, when about five miles from town, the front axle of my partner's bicycle broke, and as neither of us wanted to walk, we had to find some way of getting us both home.

When the Front Wheel of One of the Bicycles Broke Down, They were Rigged into a Tandem, and a Distance of Five Miles to Town was Covered

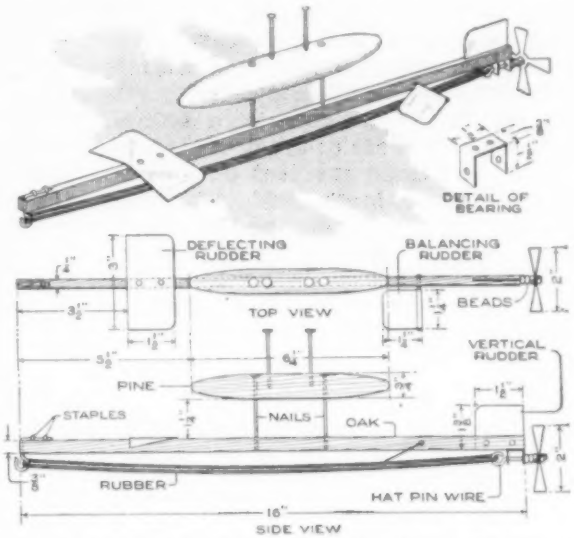
We removed the front wheel from one of the bicycles, and set the front fork on the rear axle of the undamaged machine, as shown in the sketch. The axle was just long enough so that the sides of the fork could be bolted securely. By careful riding we made the distance to town with only the slight inconvenience of my partner having to carry the extra wheel on his back.—J. F. G., Mountain Grove, Mo.

¶ Do not touch the inner surface of a tent or shelter in the rain, as the water will drip from the spot touched.

Toy Submarine Propelled by Rubber Motor

A submarine which is not as deadly as those that infest the waters of the war zone, but which will give any boy who makes it considerable fun, is shown in the illustration. It is driven by a rubber-band motor made up of a number of rubber bands linked together, or from the strands of rubber used to drive a model aeroplane. The motor is wound up by turning the propeller, which is held until the submarine is dropped gently into the water. The water should be still and at least a foot deep. The craft will gradually submerge and travel along slightly below the surface of the water until the motor gives out. The balancing rudder, shown near the stern, is necessary to counteract the action of the rotating propeller.

Make the main piece of oak, 16 in. long, as shown in the side view. The cigar-shaped upper float is of pine, ¾ by 6¼ in. long. The shaft for the propeller is made of a piece of wire bent into an eye at one end. It is fitted into a small bearing made as detailed, from a strip of tin. Beads, or small washers, are fitted between the bearing and the propeller.



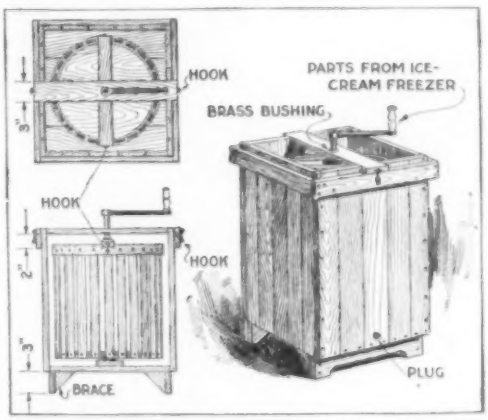
The Toy Submarine, Driven by a Rubber Motor, Submerges Itself in Still Water and Travels Slightly below the Surface Until the Motor Gives Out

The dimensions of the other parts are plainly shown in the drawings.—Howard R. Cassler, Somerset, Pa.

A Homemade Dishwasher

A DISHWASHER which is simple in design, easily constructed, and requires only a small amount of material, is shown in the illustration. It will do the work in less than half the time ordinarily required, and built on a larger scale, it could be used to advantage in a restaurant or any other place where there are many dishes to be washed.

The tank is made of matched boards, preferably hard pine, put together with brass screws. Measured inside, it is 14 in. square and 18 in. deep. The sides are cut 19 in. to allow for overlapping the bottom. White lead is used in the joints to make them watertight. A 1-in. hole, for letting out the water, is bored near the bottom and fitted with a plug. Give the tank two good coats of linseed oil and allow it to



Time and Energy can be Saved in the Large Home or Farm Kitchen by the Use of This Dishwasher

dry thoroughly before it is used.

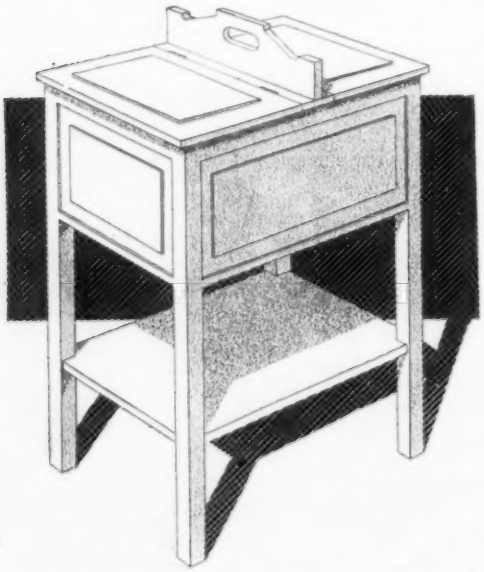
The revolving drum for the dishes is made of strips 14 in. long, 1 in. wide, and ½ in. thick, spaced 1 in. apart. The bottom is 11 in. in diameter. To make it, cleat two 6-in. boards together with ½ by 2-in. cleats. First, cut this disk eight-sided, and then trim it circular. The strips are held, at the top, between two barrel hoops, with offset joints, and fastened with screws. The top crosspiece of the drum is 2 in. wide. The drum revolves on a ¼-in. bolt. Place a large washer between the bottom of the drum and the block at the bolt.

The crank and fittings were taken from an ice-cream freezer, and others suitable can be devised easily. A piece of brass tubing was put through the crank bar for a bushing. This bar is held in position by hooks, as shown.

To use the dishwasher, the dishes are first placed in the drum, the plates being set on edge, and the others so the water can circulate freely around them. Pack them in as securely as possible. Fill the tank with hot, soapy water, and hook the two crosspieces in place. Turn the crank about 20 revolutions, and then reverse the direction. Repeat until the dishes are clean. Then drain the tank, and fill it with clean water, having it as hot as possible. Revolve the dishes a few times to rinse them, run off the water and set them out to dry.—Clifford A. Butterworth, Newton Center, Mass.

A Double-Cabinet Sewing Stand

A useful and artistic sewing cabinet of cedar, walnut, or any wood that is easy to work, and which can be stained to match the furniture in the room, may be made, as detailed, by anyone handy with woodworking tools. The front, back, sides, and top are paneled.



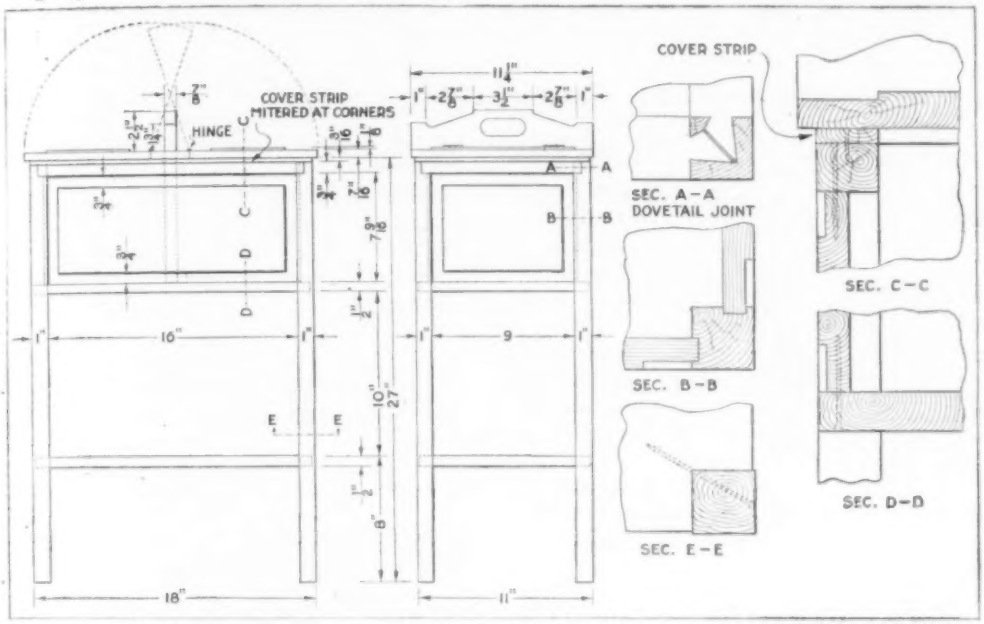
The Sewing Materials and Articles in Use are Kept in the Hinged-Lid Compartments, and the Cabinet can be Carried Easily.

The cabinet can be made more attractive by selecting the wood for the panels so the knots or figures come near the center. Similar construction may also be used, and the cabinet portion made without panels. The cabinet is 27 in. high, 18 in. wide, and 11 in. deep. The legs are made of straight-grain wood.

The panels are cut in one board, the total length of the front, back, sides, and top, allowing for saw cuts and poor wood, by rabbeting out the edges. When the sides of the board are rabbeted, the board is cut into lengths, and the ends of each panel are rabbeted. The top rail above the panels is fastened to the legs with dovetail joints, as detailed. The cover strip is mitered at the corners.

In assembling the parts, nails are used only where they do not show from the outside. The panels are glued into the legs, as shown. The bottom of the cabinet, lower shelf, and handle are fastened with glue, and then nailed. The nails are set and the holes plugged with a mixture of glue and sawdust, sandpapered smooth when dry. When the hinges are fitted, the cabinet is ready for the finish. If cedar is used, brush light-mahogany oil stain on the

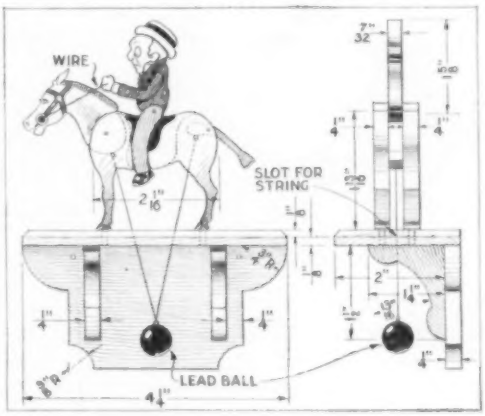
light streaks in the wood. A coat of stain, an equal mixture of light-mahogany oil stain and turpentine, is then applied, followed, in a day, by a coat or two of shellac, each coat rubbed with steel wool when dry. Two coats of wax give a good outer finish. The inside of the cabinet is left unfinished, to preserve the spicy cedar odor.—A. F. Krueger, Champaign, Ill.



Details of the Construction: The Pieces are All Readily Cut and Shaped. Plain Panels may be Used

A Horse-and-Rider Toy

An interesting toy which a boy can make from ¼-in. wood is a horse and rider which have lifelike movements, actuated by a swinging lead ball. The rider and his mount are set on a small bracket shelf which can be fastened to the wall. Make patterns of strong paper, shaping them as shown in the illustration. First cut out the parts for the shelf, using a fine coping saw or a jig saw. Nail the shelf parts together and bore holes in the top of the shelf for the pegs which hold the horse in position. Cut a slot through the middle of the shelf so that the string, on which the lead ball hangs, has room for play. Mark the shape of the parts of the horse carefully on paper and then transfer them to the wood. Note that the rider is made principally of one piece, including the head, body, and arms. The legs of the rider are painted on the side of the horse, and the upper and lower ends of the legs should be shown on the pattern from which the shape of the horse's body is marked on the wood. The head and tail are made separately and fit between the two sidepieces of the body. The head and

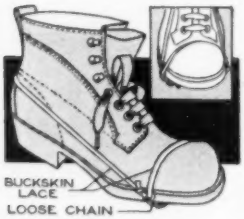


The Horse and Rider Have a Lifelike Action When the Lead Ball is Swung on the Cord

tail are pivoted on brads and the lead ball is suspended from a string, one end of which is fastened to the horse's neck and the other to the tail, as shown. —Harry B. Mowery, New Holland, Pa.

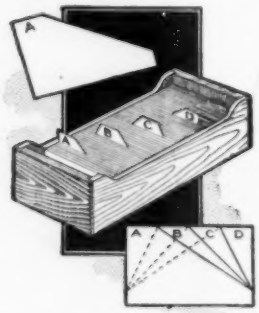
Quickly Detached Nonslip Chain for Shoes

A safety shoe chain, which I have used to good advantage on hard snow and slippery ice, can be adjusted on the shoes in a few minutes and as quickly removed. I took a piece of chain about as long as the width of the sole of the shoe, and looped a buckskin lace through the ends of it, as shown in the sketch. The chain is tied in the buckskin so that it hangs loose under the sole, and can readily adjust itself to irregularities in the ice or snow. The lace is slipped over the heel of the shoe, and tied with a convenient slipknot.—Glenn Brown, Salt Lake City, Utah.



Index Guides Quickly Made

Making card guides for a file is usually tedious work, and often unsatisfactory. A practical method, which provides index tabs with a minimum of cutting, is shown in the sketch. The first card is cut as at A, the second as at B, and so on. These are then used as patterns and the other cards cut in series from them. A good method is to cut all the cards of one shape at the same time by clamping them between boards and using a sharp knife.—L. E. Turner, Brighton, Mass.

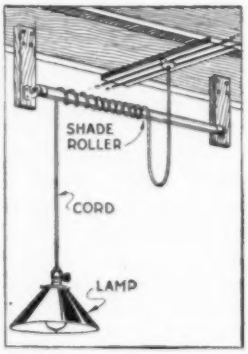


Open Screw Eyes Handy for Use on Wall Hooks

In hanging up small tools and other articles, such as brushes, buttonhooks, etc., it is a nuisance to locate the wall hook on which the eye or screw eye, set in the end of the handle, is threaded. A good kink is to open the screw eyes sufficiently so that they may be hooked over the wall hook at the opening. Several articles can thus be placed on the same hook, without the necessity of removing those in front to take off the others.—M. T. C., Chicago, Ill.

Electric-Light Cord Adjuster Made of Curtain Roller

A device for adjusting an electric-light cord over a bench lamp that is as convenient as rolling a window shade, was made of an old curtain roller using the same end fittings. The roller was mounted on two strips fixed to the joist overhead, as shown, and the cord wrapped around it. The lamp is raised and lowered by drawing on its cord just as the shade is adjusted.



Old Tennis Balls Provide Typewriter Cushions

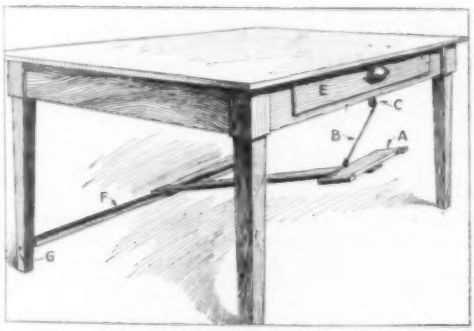
To deaden the noise of a typewriter, and to protect it from its own racking vibrations, take two "dead" tennis balls, cut them into hemispheres, and at the top point on the curve of each half, cut a hole to accommodate the feet of the typewriter. Then set the typewriter on these, placing the feet in the holes in the tops of the hemispheres. The vibration is taken up in the rubber cushions formed.—A. S. Allen, La Belle, Mo.

Brightening and Cleaning Silver or Filigree Work

To clean silver or filigree work make up a paste of cream of tartar with water, and rub it well into the crevices. Then wrap the piece in flannel and let it remain for five or six days, after which the paste may be removed by washing with warm water. If the filigree silver has become black and dull, wash it thoroughly in hot potash water, which will cleanse it and restore its brightness. Rub the flat surfaces with a soft toothbrush, and then place the piece in the following solution: one part of alum, one part of table salt, two parts of saltpeter, and four parts of water. Soak in this for about five minutes, rinse thoroughly in clear, cold water, wipe dry, and polish with chamois.—A. A. Kelly, Malvern, Pa.

A Pedal for Opening a Drawer

With both hands filled with cooking utensils, one has difficulty in opening the drawers in the kitchen or work table. A pedal, A, fitted beneath the drawer E, as shown, was thus found convenient. To a rod of wood, F, pivoted between the rear legs, at G, a lever was nailed. A cord, B, was run

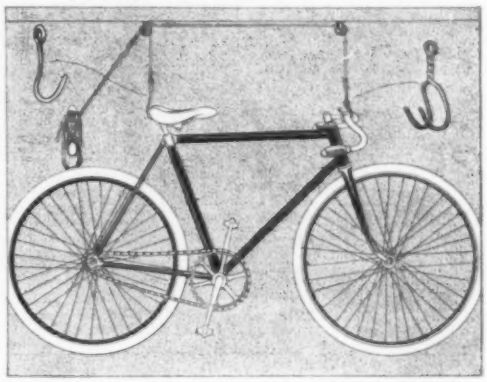


The Drawer is Opened by Stepping on the Pedal

from the pedal over a pulley C, fastened to the table frame and to the back of the drawer. To open the drawer, the pedal is stepped on; to close it, the drawer is pushed.—R. E. Landon, Seattle, Wash.

Bicycle Supported from Pulleys for Storage and Repairing

The storage of a bicycle as well as a handy arrangement for repairing it, is provided by suspending the machine



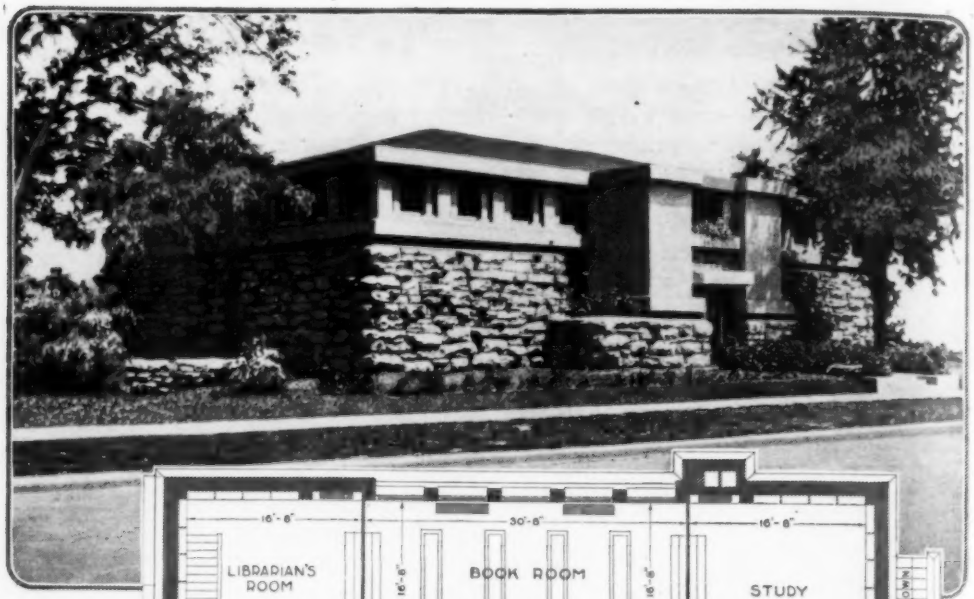
By Supporting the Bicycle on a Rope-and-Pulley Arrangement, the Tires are Kept from the Floor, and Convenient Access in Repairing is Afforded

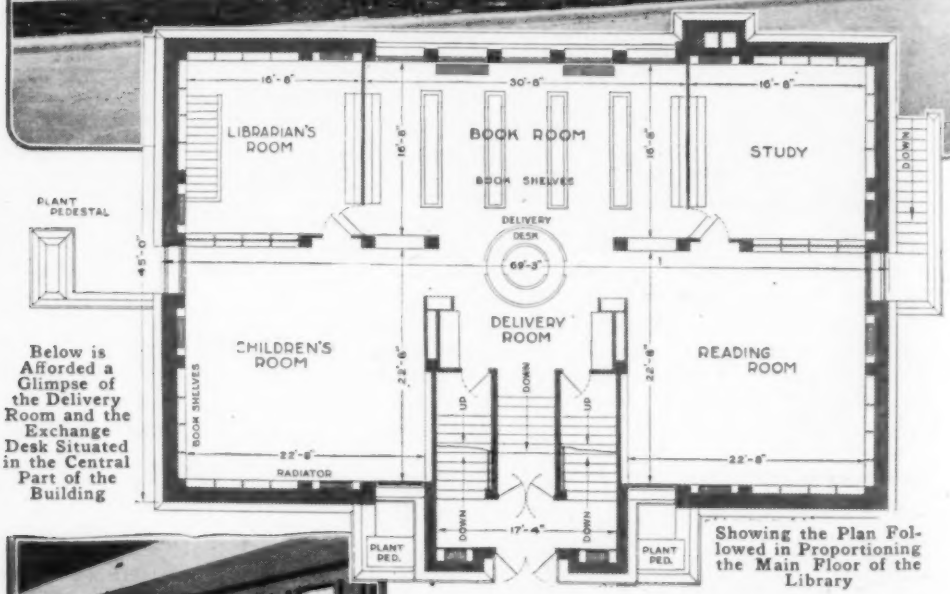
from ropes fitted with suitable hooks and pulleys, as shown. The bicycle should not be stored with its weight on the tires, and this method takes care of that feature. The pulleys are arranged at the ceiling with a double rope, so that either end of the bicycle can be raised or lowered, as desired, for convenient repairing. By the use of both ropes the height can be varied, even to bring the lower working parts several feet above the ground, which is often a great convenience.

Call Service for Patrons of Movie Theaters

When a person in the audience is wanted at the box office, or on the telephone, the moving-picture machine operator in a certain theater writes the name of the person wanted on a piece of glass, and holds the glass in front of the projector, so that the name is thrown on the screen. If one expects a call, he has only to leave his name at the box office. Black drawing ink and an ordinary steel pen are used for writing on the glass, and the writing is wiped off after the message has been shown, so that the same glass can be used many times.

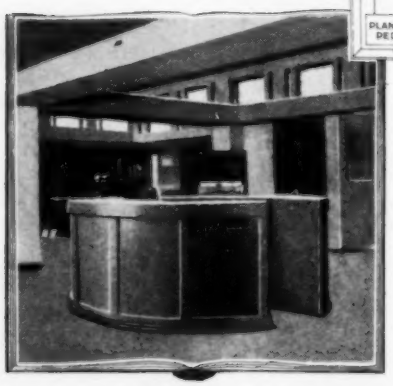
PUBLIC LIBRARY INDEX TO COMMUNITY TASTE





Below is Afforded a Glimpse of the Delivery Room and the Exchange Desk Situated in the Central Part of the Building

Showing the Plan Followed in Proportioning the Main Floor of the Library



PUBLIC buildings of distinctive and artistic architecture always reflect credit upon the intelligence and progressiveness of a community. For that reason Anna, a small Illinois town, which boasts a library of unusual lines and commanding appearance, possesses an asset of considerable value to its citizens. The structure, illustrated herewith, indicates what can be accomplished in almost any small municipality at an expense of about $25,000. It is fireproof and constructed of native limestone, concrete, and steel. The interior walls are finished with rough plaster and tastefully tinted, while the trim is of heavy fumed oak. As will be observed, the outdoor aspect of the window scheme is striking. Inside it is even more effective, for the long, narrow openings on either side of each window break the blank wall space attractively. Stained, leaded glass is used. Adequate description of the practical arrangement of the main floor is supplied by the plan presented above. A large part of the basement, which is nearly level with the ground, is equipped as an auditorium. In addition there is enough room for storage space, wardrobes, toilets, janitor's quarters, and the heating plant.

Victrola XVII, $250
Victrola XVII, electric, $300
Mahogany or oak

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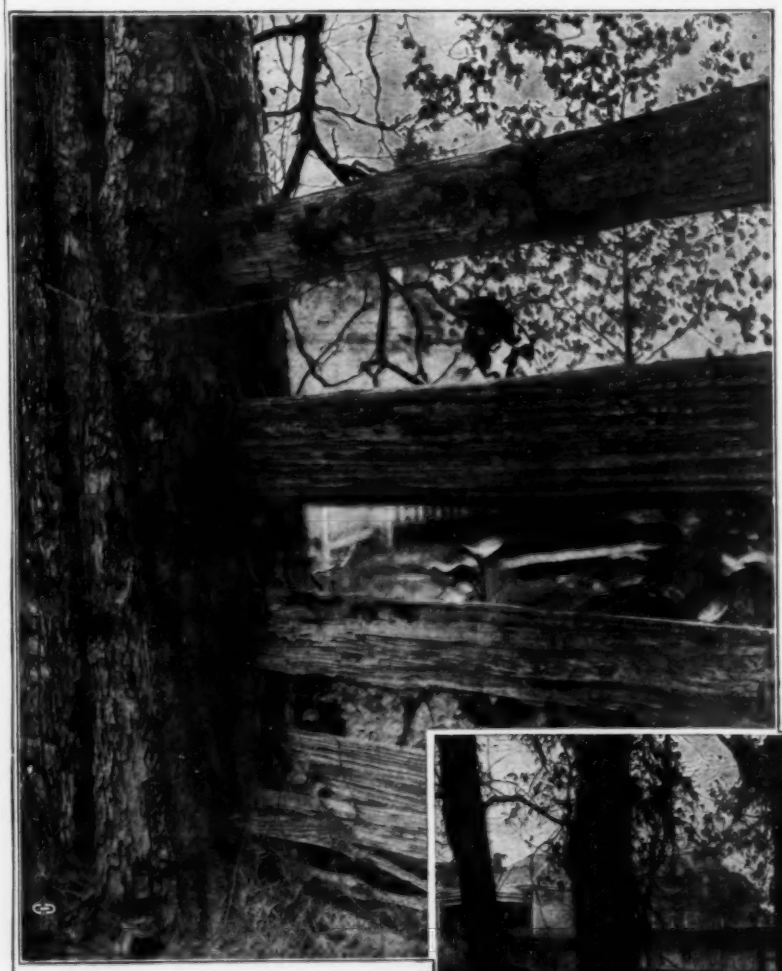
Does Cypress "The Wood Eternal" Last?!

Study These Photographs of an "Ingrowing Fence"



WITHOUT A NAIL OR A PEG IN IT.

Below is a glimpse down a country highway ("de big road," as Uncle Remus called it) near Monroe, Louisiana. That fence has no posts. It was built by forcing split Cypress boards between saplings. This occurred so many years ago that nobody knows when it was, nor who was the labor-saving genius who did it. Then the trees grew, and grew, and grew.

NOW, PLEASE, study the larger photograph and see in detail how the fence looks today. Note the size of the tree, and how deeply are embedded the ends of those old Cypress rails—no one can tell how deep they extend in. Note, also, how weathered they are, yet they ring as true and sound under a hammer as though just hewn. Were those old Cypress boards somebody's money's worth? Why should not YOU do as well with *your* lumber money—whether you are building a beautiful home or just patching up the old place? (USE CYPRESS.)

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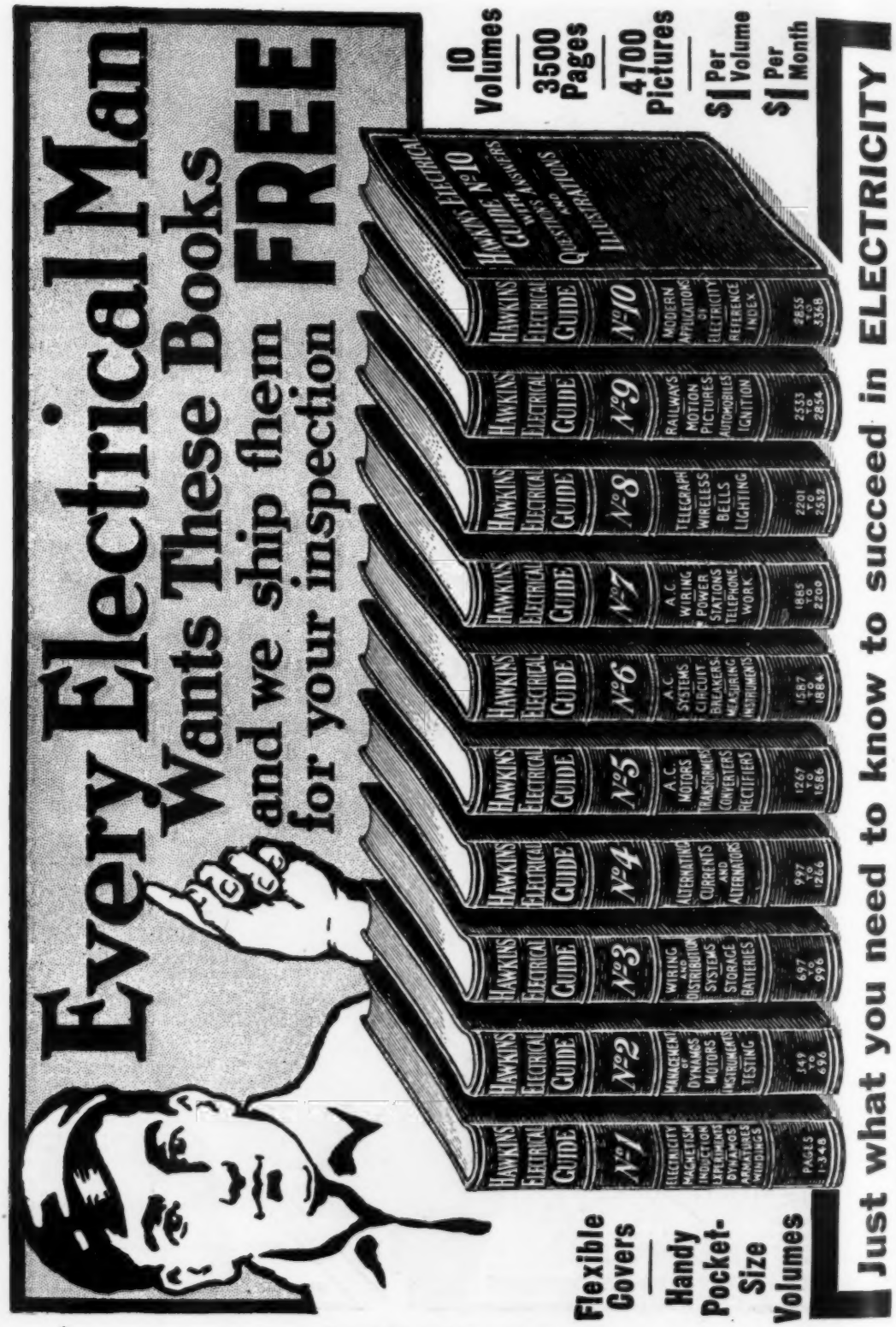

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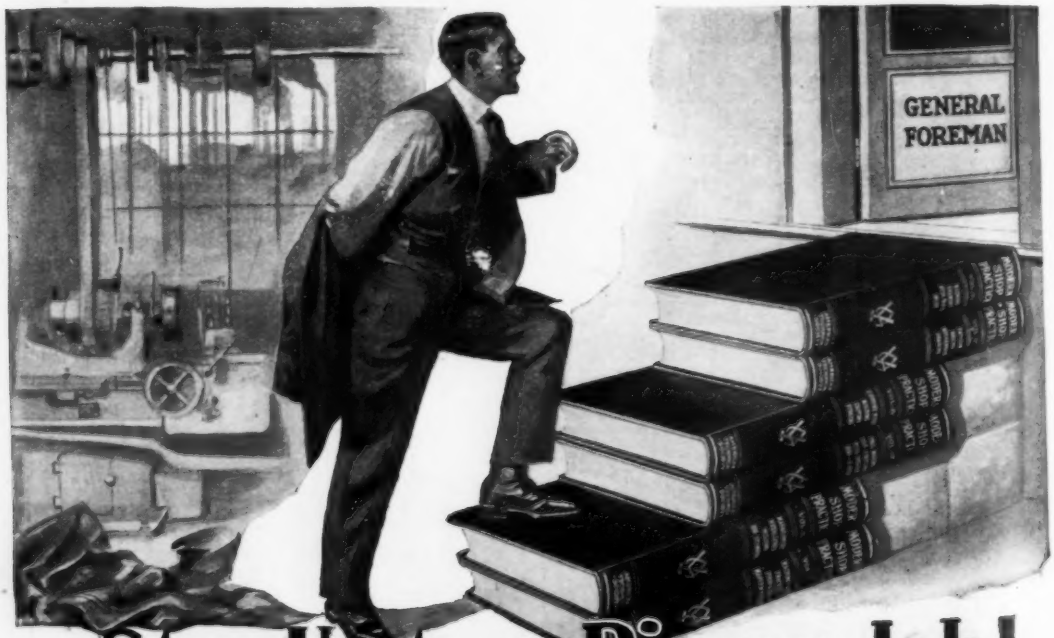

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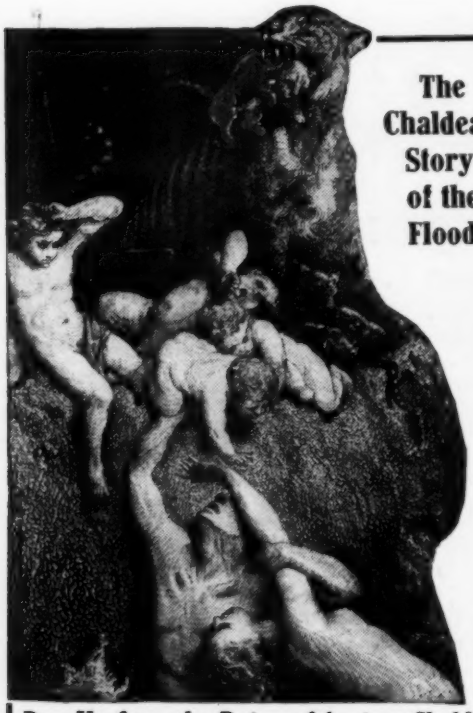

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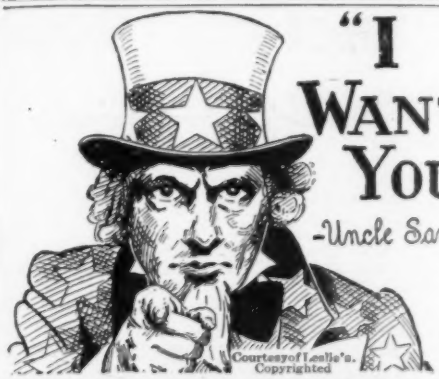

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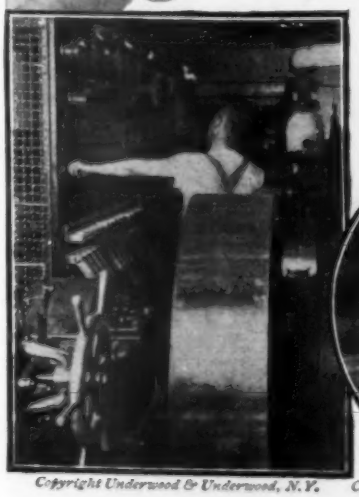

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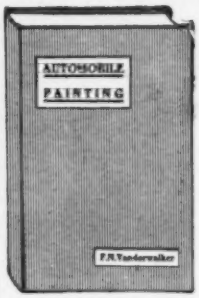

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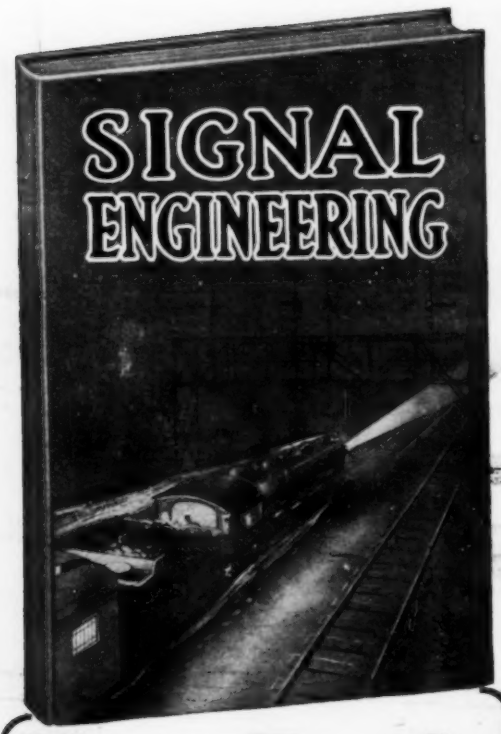

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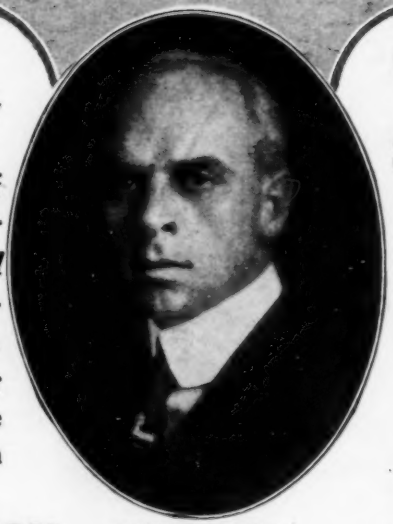

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TAILORING Agents Wanted—Big complete sample outfit and case, nearly 300 large cloth samples, 3 piece lists and everything needed for canvassing, or use in store, free to live agents. $25.00 to $50.00 a week; may make more. Write us today for free elegant outfit to begin, cloth samples, wholesale prices, special offer on a suit for yourself and full information—see our wonderful values, beautiful fabrics and styles. Established 28 years. Every garment made to measure—everything guaranteed and express prepaid. Just send a postal. American Woolen Mills Co., Dept. 1214, Chicago.

WANTED Reliable People—Place Eggine in stores and appoint agents. Takes place of eggs in baking and cooking at 9c doz. Large package and particulars 10c postpaid. Morrissey Company, 4403-5 Madison, Chicago.

"RADIO" Luminous Paint at Wholesale. Quarter Pints 50c stamps. Highest Power, Sole Manufacturers. American Luminous Products Co., Huntington Park, California.

AGENTS—Get Particulars of the best paying proposition ever put on the market; something no one else sells; make $4,000 yearly. Address E. M. Feltman, Mgr., 5139 3rd St., Cincinnati, O.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Rejects credited. Prompt shipments. Send for latest catalogue and prices. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

AGENTS, 500% Profit, Sign-Letters for office and store fronts. Samples and particulars Free. Inter-States Letter, 2424 N. Halsted St., Chicago.

AGENTS: A Live Wire accessory for Ford Cars. Sells on sight to dealers and car owners. Nothing else like it, no competition, appeals to every Ford car owner whether his car is driven by himself, his family or an employe. Bill Manufacturing Co., 101 Factory St., La Porte, Ind.

$15.00 MADE first day by 13-year-old boy with shomescope. Woman made $6.00 first hour. Particulars Free. Shomescope Mfg. Co., 4923 Montgall, Kansas City, Mo.

$1,000.00 REWARD if my High-Grade Formulas are not Money-Makers for those who Manufacture various Big Selling Specialties from them. Latest Food Products, Washing Tablets, Automobile Specialties, Tube Flavors, Dry Cleaners, Rust Soap, Luminous Paint, Polishes. No Trash. Valuable Information and latest lists—Stamp. Established 20 years. Miller, Analytical Chemist, Tampa, Florida.

AGENTS wanted to sell Eggnit—a pure food substitute for eggs. Easy selling article—big profits—quick repeater. Stuart & Co., 16 Main St., Newark, N. Y.

BIG value Xmas package. Cards, booklets, tags, seals, everybody buys. Good profits. Sample 10c. Ufert, 236 W. 41st, New York.

AGENTS: A golden opportunity selling Yanoco "Quality Ivory" combs, brushes, mirrors and other toilet requisites. Ten to forty dollars weekly. Best season now. Ideal holiday line. Sells on sight. Yanoco Ivory Co., Leominster, Mass., Ave. P.

"WE start you in business, furnish everything; men and women; make good weekly income." Majestic Printing Co., 3044 Leeward, Los Angeles, Cal.

AGENTS: Even if you were deaf, dumb and blind you could sell our Aluminum Utensil Cleaner. Every housewife grabs it on sight. Steady trade and big money in protected territory. Write quick. Div. Pol. American Aluminum Mfg. Co., Lemont, Ill.

FREE sample with particulars. No splashing water strainers. Easy seller. Returns big. Experience unnecessary. Union Filters Co., New York.

AGENTS, $50 a week. Will show you how. Genuine Gold Leaf Window Letters. Chicago Agency Co., 842 Altgeld St., Chicago.

AGENTS — Stamping names on Pocket Key Protectors; sample Check with your name and address, 12c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 404 N. Clark St., Chicago.

HUGE profits selling Nibco Sanitary Brushes, Auto Washers, Brown Beauty Adjustable Floor Mops, Dustless Dusters, and other specialties. Big line. Fast sellers. Write today. Silver-Chamberlin Company, Department M, Clayton, New Jersey.

AGENTS sell Reliable Custom-Made Raincoats and Gabardines. Big commission. Complete sample line free. Temple Raincoat Company, Templeton, Mass.

RAINCOATS—Direct from factory. Agent's price $2.95 delivered. Retail price $5.00. Agents average six coats daily. Rainy season now here. W. Lewis Raincoat Co., Cleveland, O.

AGENTS: Sell "Ironglide." Great new starch enamel. Wonderful success. Women delighted. Free samples. Big profit. 25 other articles. All winners. Write today. G. H. Brummund, Horicon, Wis.

AGENTS for H & H Solder Cement; Mends Aluminum and all metals; applied cold or with heat; indispensable for household, automobiles and motorboats; neither heat nor water affect it; send 10c for sample and agents' proposition. H & H Sales Co., Orange, N. J.

RELIABLE people wanted. Place Hall's sore throat remedy in stores and appoint agents. 20c for sample. Hall Drug Co., Mifflinburg, Pa.

NINETY Per Cent of Your Calls Turned into Sales! Wonderful Enthusiasm Follows Every Demonstration! Write at Once for Full Particulars of Our Line of Eradium (Luminous) Articles. Startling! Mysterious! Everlasting! Novel! They Shine in the dark. Crucifixes, House Numbers, Bulbs, Match Boxes, Pictures, Switch Plates. Sole Manufacturers. The Pioneer Corporation, 1259 W. 63rd, Chicago.

KEROSENE Gas Burners in Cook Stoves or Ranges stop use of wood or coal. Recently patented. Money-maker for Agents. The Vapor Gas Burner Co., Desk 8, Columbus, Ohio.

AGENTS: Sell Neverfail Iron Rust and Stain Remover. Always seasonable. Huge Profits. Big line. Credit. Sample. Sanford-Beal Co., Inc., Newark, New York, Dept. C.

MAN Wanted in each country community and every small town, to wear beautiful new tailored-to-order suit of clothes and be Agent in spare time among friends, relatives and neighbors. Confidential wholesale prices given, good profit on each order. No experience required, we teach you all you need to know. Write at once and get gorgeous, illustrated book of cloth samples free, and full instructions. Banner Tailoring Co., Dept. 605, Chicago.

CONVEX Portraits, frames, pillow tops. Lowest prices. Liberal Terms. Free catalog. Brewer Art Co., Shelbyville, Ind.

AGENTS wanted. Economy Kerosene Burners for cooking and heating stoves. Big profits. Exclusive territory. Economy Mfg. Co., 1323 N. Dearborn St., Chicago, Ill.

AGENTS. "Eggite," the guaranteed substitute for fresh eggs, means eggs at 8 cents per doz.; enormous demand everywhere; big profits; sample free. Thomas Dougherty, 157 East 47th St., New York.

YOU can be your own boss with our Key Check outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 15 cents. Pease Die Works, Dept. M., Winchester, N. H.

1917'S GREATEST Sensation! 11-piece toilet goods combination selling like blazes at $1.00 with $1.00 Carving Set Free. Everybody buys. Engle's profit first week $51.00. Great crew proposition. P. Pierce Co., 902 Lake St., Chicago.

MAKE and Sell Your Own Goods. Machinery unnecessary. Expert Chemists advice. Special attention to beginners. Formula Catalog for Stamp. Blake Mystic Company, Washington, D. C.

AGENTS. Something new; Free sample. Foreign inquiries invited. Famous Products Co., Decatur, Illinois.

EVERY home on farm, in small town or suburb needs and will buy the wonderful Aladdin kerosene (coal-oil) Mantle Lamp. Five times as bright as electric. Tested and recommended by Government and 34 leading Universities. Awarded Gold Medal. One farmer cleared over $500 in six weeks. Hundreds with rigs or autos earning $100 to $300 per month. No capital required; we furnish goods on time to reliable men. Write quick for distributor's proposition and lamp for free trial. Mantle Lamp Co., 528 Aladdin Bldg., Chicago, Ill.

INSYDE Tyres, inner armor for Automobile tires, double mileage and prevent punctures and blowouts. Quickly applied. Cost little. Demand tremendous. Profits unlimited. Details free. American Automobile Accessories Co., Dept. P, Cincinnati, O.

GET Davis' Latest Proposition. $15.00 daily a cinch. No matter how many times you have answered my ads in last 20 years, write again. E. M. Davis, Dept. 506, 900 Lake, Chicago.

LARGE Manufacturer wants representatives to sell shirts, underwear, hosiery, dresses, waists, skirts, direct to homes. Write for free samples. Madison Mills, 503 Broadway, New York City.

NEW Patriotic War Atlas Free with my 1917 "Business Guide." Sells everywhere. Beginners clear $7 daily. 50% commission. Outfit free. Prof. Nichols, Box P. M. 3, Naperville, Ill.

DO you want to travel at our expense? We want good men and women for traveling general agents. Must have fair education and good references. Will make contract for three months, six months or year at salary $22.50 per week and necessary expenses. Can assign most any territory desired. For full particulars address George G. Clows Company, Philadelphia, Pa., Dept. 4-1

$10 A DAY Profit—manufacture Barley Crisp; new confection; 5c package costs you 1c; machine, instructions complete, $7.50 prepaid; send 10c for samples. Barley Crisp Company, 1267 Broadway, San Francisco.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404B Amsterdam, N. Y.

AGENTS—Send for sample "Fretnot"—the wash day wonder. Be convinced you can do a whirlwind business. You can clear at least $20 to $100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credit given. Don't call. P. M. Motter & Sons, 3213 Warren Ave., Chicago.

AGENTS make 500 per cent profit selling our Auto Monograms and Initials, Window Sign Letters, Changeable Signs, and Show Cards. 1,000 Varieties. Enormous Demand. Sullivan Co., 1123 Van Buren St., Chicago, Ill.

DECALCOMANIA Transfer Initials and Flags: You apply them on automobile while they wait. You can make $1.38 profit on $1.50 job; free particulars. Auto Monogram Supply Co., Dept. 1, Niagara Bldg., Newark, N. J.

DISCOVERED! Extraordinary New Proposition. Supreme Opportunity. $200 per week Easy, demonstrating marvelous Adding Machine. Retails $7.50. Work equals $300 machine. Subtracts, Multiplies, Divides, automatically. Whirlwind in speed. Guaranteed Five Years. Used by U. S. Government. Sells everywhere. Amazing profits. Write quick for exclusive territory. Calculator Corp., Dept. PM, Grand Rapids, Mich.

NEW invention, fast seller to all classes. Popular price, many buy dozens, no competition. Big profit. Dandy mail-order proposition. The Clark Co., Clark Building, Jacksonville, Fla.

WANTED. General Agent to represent us in your locality. Exclusive territory. Big inducements. Chicago Agency Co., 840 Adgeld St., Chicago.

WANTED—New Ideas. Write for list of Patent Buyers and Inventions Wanted. $1,000,000 in prizes offered for inventions. Our Four Books sent free upon request. Victor J. Evans & Co., 163 Ninth, Washington, D. C.

AGENTS — Ho-Ro-Co Skin Soap and Toilet Goods plan beats everything for agents' profits. "Ho-Ro-Co.," 112 Locust St., St. Louis, Mo.

AGENTS: $30 to $100 a week. Free samples. Gold sign letters for Stores and Office Windows. Anyone can do it. Liberal offer to general agents. Metallic Letter Co., 407 N. Clark, Chicago.

CALIFORNIA Flower Bead Necklaces beat anything for quick sales and profits. Absolutely new. Write for agent's proposition. Mission, 2819 PM, West Pico, Los Angeles, Calif.

AGENTS, Make Big Money; fast office seller; particulars and samples free. One Dip Pen Co., Dept. 2, Baltimore, Md.

AGENTS — $5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 762 North St., Dayton, Ohio.

HOSIERY and Underwear Manufacturer offers permanent position supplying regular customers at mill prices. $50.00 to $100.00 monthly. All or spare time. Credit. D. Parker Mills, 2733 No. 12th St., Phila., Pa.

AGENTS — Sell rich-looking imported 36x68 rugs, $1 each. Carter, Tenn., sold 115 in 4 days. Profit, $57. You can do same. Write for sample offer selling plan; exclusive territory. Sample rug by parcel post prepaid, 98c. E. H. Condon, Importer, Stonington, Maine.

FEATHER Flowers, the all-purpose Home flower. Business clean, attractive, profitable. Sample fifteen cents. De Witt Sisters, Route Ten, Battle Creek, Mich.

GAS Fire in any cook stove from common coal oil. Agents coin money. Wonder Burner Company, Columbus, Ohio.

AGENTS make $100.00 monthly selling our 500 Handy Household Articles; Catalogue free. Scheff Company, Desplaines, Ills.

AGENTS—Steady Income. Large manufacturer of Handkerchiefs and Dress Goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Whole or spare time. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

GRAB Territory on our new specialties. Full line samples and terms $2.00. Money back if wanted. Adam Fisher Mfg. Co., 2061-G, St. Louis, Mo.

AGENTS—Make and sell your own goods. 24 valuable manufacturing formulas and big formula catalog 10c. "The Ideal," Box 543-A, Chicago.

AGENTS—Year's Biggest Seller—everybody making big money. Protective territory. Write immediately. Bestever Products Co., B-14, Douglas Park Station, Chicago.

AGENCIES WANTED

GENERAL Agencies, Manufacturers' Distributors, Sale Promoters, Consignments, Mail Orders. Guaranteed Articles Only. The R. W. Slater Co., 2326 First Avenue, Seattle.

SALESMEN WANTED

WERE You Ever Offered a Grocery Store? Our Proposition is Better. Let us tell you how you can handle Flour, Canned Goods, Provisions, an entire line of groceries, as well as Paints, Roofings, Stock Foods, Automobile and Machinery, Oils and Greases. No rent to pay. No investment in stock. Large orders taken from samples. Goods of guaranteed and proven quality. Selling experience not necessary. Very profitable work for "workers." Address Hitchcock Hill Co., Dept. 200, Chicago, Ill. Reference: Any bank or express company.

SALESMEN—Get our plan for Monogramming Automobiles and motorcycles by transfer methods. Very large profits. Motorists' Accessories Co., Mansfield, O.

HIGH-GRADE salesmen, experienced in electrical lines, to sell much needed specialties to doctors and others, no competition. Unlimited opportunities. Only men of unquestionable ability and integrity need apply. Western Coil & Electrical Co., Racine, Wisconsin.

SALESMEN Wanted Jan. 1st—Excellent line Signs and Novelties. Traveling expenses advanced. Liberal commissions. Exclusive territory. Give age, height, weight, road experience and three late business references. Stanford-Crowell Co., Ithaca, N. Y.

$7.50 COMMISSION each sale and repeat orders; traveling salesmen among general mercantile trade; every State; weekly settlements; no competition; pocket sample. Toledo Cable Co., 443 Davis Bldg., Toledo, Ohio.

BRAINS, ability, experience can connect with Managership and American dollars. New National Corporation. Howard Smith Co., Washington, Penna.

SALESMEN: Every man buys. Retails $1.00. Costs 5c. Oscar Hanson, Mentor, Minn.

TRAVELING Salesmen Wanted—Experience unnecessary. Earn while you learn. Hundreds of good positions open. Write today for large list of openings and testimonials from hundreds of members we have placed in positions paying $100 to $500 a month. Address nearest office. Dept. 125-W, National Salesmen Training Association, Chicago, New York, San Francisco.

WHEN tired of "Get rich quick schemes," write for our line of standard auto supplies; build a business among garages and dealers. $10 daily easily made. Auto Equipment Co., "Manufacturers," Roxborough, Philadelphia, Pa.

SALESMEN calling on Manufacturing and Factory Trade to sell High-Grade Legitimate product as a side-line. No samples to carry. Liberal commission proposition. Write North American Linseed Products Co., Cleveland, Ohio.

SALESMAN—$6,000 Accidental Death, $30.00 Weekly Accident Benefit, $25.00 weekly Sick Benefit, $10.50 yearly, half amount $5.50. $250,000 deposited Insurance Department. Experience Unnecessary. Become independent—own your business. Guaranteed steady income from renewals. Registration, Dept. B, Newark, N. J.

WANTED — Representatives everywhere, Exclusive territory. Gold sign letters for stores and office windows. Any one can put on. Write today for free sample. Metallic Letter Co., 403 N. Clark St., Chicago.

SALESMEN—Acquainted with grocery trade. Large demand; liberal commission; pocket sample. Wirth Salesbook Co., Dept. P., Chicago.

EARN $5,000 to $20,000 yearly. New business necessity. Retails $5 to $200. 100-200% profit. Purchaser satisfied or money refunded. No competition. Exclusive territory. Free samples. Sayers, 408 Wainright, St. Louis.

HELP WANTED

FOREMEN, Shopmen, and Officemen Wanted to work spare time as special representative of large well-known mail-order house, selling Watches, Diamonds, and Jewelry on Credit. Liberal commissions and exclusive sales rights granted. No investment or deposit required for outfit or samples. Write at once for details. Address S. D. Miller, Dept. 24, Agency Division, Miller Bldg., Detroit, Mich.

UNCLE SAM has thousands of jobs open this year. I will help you get one. Write for my big Free book, DX-29. Earl Hopkins, Washington, D. C.

I HAVE an opening for a man who is honest, capable and industrious. Prefer one with previous sales experience. Will pay $25.00 per week to the man who can make good. One bank and two business references required. Address C. A. Nudson, 717 Capital Bldg., Topeka, Kans.

WANTED Immediately: Men—Women. Government war jobs. $100 month. List free. Franklin Institute, Dept. J-21, Rochester, N. Y.

GOVERNMENT Examinations. Most thorough preparation, $5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

GOVERNMENT Positions are easy to get. My free booklet BY-29 tells how. Write today—Now. Earl Hopkins, Washington, D. C.

FIREMEN, Brakemen, all railroads, everywhere. $100-$150 monthly, experience unnecessary, position guaranteed. Railway Association, Dept. 254, Brooklyn, N. Y.

RAILWAY Mail Clerks wanted immediately. Men 18 up. $75 month. List positions free. Franklin Institute, Dept. J-21, Rochester, N. Y.

CARTOONING. Sign and card writing made easy. D. Freeburn System, Hicksville, Ohio.

DO you want a position for life, with big pay, short hours and sure advancement? Then work for Uncle Sam. My free illustrated book DK-29 tells how to get an appointment. Earl Hopkins, Washington, D. C.

WANTED ambitious, able salesmen to sell high grade oil securities, large commission. Knapp, 1509 Singer Building, New York.

HUNDREDS Government War positions open. Men—women wanted. $100 month. Write immediately for list. Franklin Institute, Dept. J-21, Rochester, N. Y.

GOVERNMENT pays $900 to $1,800 yearly. Prepare for coming "exams" under former Civil Service Examiner. New Book Free. Write Patterson Civil Service School, Box 3029, Rochester, N. Y.

FREE Illustrated Book tells of about 300,000 protected positions in U. S. service. Thousands of vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Just ask for booklet CS-29. No obligation. Earl Hopkins, Washington, D. C.

PICK up some easy money gathering butterflies, insects. I buy 750 kinds. Some $1—$7. Intensely interesting. 2c stamp brings prospectus. Get posted. Sinclair, Box 244, D6, Los Angeles, Cal.

WANTED—Telephone Switchboard Installers. Steady employment. Good wages. Bonus. Liberal sickness, disability and pension plan. Ages 19 to 35 years. High-school education preferred. Experience not necessary. We will teach beginners at our expense. Address, Western Electric Company, Inc., Department No. 6502, Hawthorne Station, Chicago, Illinois.

WANTED—Civil Service examinations open the way to good Government positions. I can teach you by mail at small cost. Full particulars free to any American citizen of eighteen or over. Write today for booklet CE-29. Earl Hopkins, Washington, D. C.

FOREMEN for tank factory, to take charge of factory in K. C. Manufacturing stock tanks, hog troughs, grain bins and other sheet metal products. Must be competent to handle men, and be able to read plans, make estimates. Good opportunity. State age, experience and other qualifications; strictly confidential. H. J., Room 900, 78 E. Madison St., Chicago.

WANTED—Skilled mechanics in all lines, for Detroit and other cities. Highest wages. Send for registration blank. It's free. Earl Conway, 299 Antoine St., Detroit, Mich.

GET a sure Job with big pay, steady work, short hours, regular vacations, rapid advance. Thousands of positions open with Uncle Sam. I will prepare you in a few weeks at small cost. Write immediately for big free book DU-29, with special offer. Earl Hopkins, Washington, D. C.

MAKE money writing Photo-plays; details free to beginners. No correspondence course. Producers' League, 230 Wainwright, St. Louis.

INVENT something. Your ideas may bring wealth. Free book tells what to invent and how to obtain a patent through our credit system. Talbert & Parker, 4102 Talbert Building, Washington, D. C.

WANTED—Men to become chauffeurs, $25 week. Earn while learning. Franklin Institute, Dept. J-802, Rochester, N. Y.

U. S. GOVERNMENT wants help. Men—Women, 18 or over. $90 month. War means many vacancies. Write for list positions obtainable. Franklin Institute, Dept. J-21, Rochester, N. Y.

WANTED—Men and women to qualify for Government positions. Several thousand appointments to be made next few months. Full information about openings, how to prepare, etc., free. Write immediately for booklet CG-29. Earl Hopkins, Washington, D. C.

FIREMEN, Brakemen, Baggagemen, 8 hours, $140. Colored Porters wanted everywhere. Experience unnecessary. 810 Ry. Bureau, East St. Louis, Ill.

MEN wanted to make Toy Soldiers, Army, Navy, Patriotic emblems and novelties. Spare-time homeworkers and manufacturers. Enormous demand, big business. War stopped importation. We buy the whole output or all surplus over sales, the whole year. Experience or tools not necessary. Casting form outfit from $2.50 up. More than 100 made complete per hour. Greatest chance for industrious people. Booklet and information free. Toy Soldier Manufacturing Company, 32 Union Square, New York.

MEN—Become U. S. Railway Mail Clerks. $75 to $150 month. Every second week off with pay. Education unnecessary. Sample examination questions free. Write immediately. Franklin Institute, Dept. J-21, Rochester, N. Y.

MEN wanted to learn automobile business in Detroit. Experience not necessary. Can earn good salaries, with excellent chances for advancement. Address National Service Bureau, 756 Woodward Ave., Detroit, Michigan.

RAILROAD Traffic Inspectors Wanted. $125 a month and expenses to start; short hours; travel; three months' home study under guarantee; we get you position. No age limit. Ask for booklet L-4. Frontier Prep. School, Buffalo, N. Y.

RAILWAY Mail Clerks wanted. $75.00 month. Examinations soon. Also Salesmen wanted. Civil Service and Salesmanship Courses by mail. For "Free Tuition Plan," address Carnegie College, Rogers, Ohio.

THE Way to Get a Government Job is through the Washington Civil Service School. We prepare you and you get a position or we guarantee to refund your money. Write to Earl Hopkins, President, Washington, D. C., for book FK-29, telling about 292,296 government positions with lifetime employment, short hours, sure pay, regular vacations.

STOP that daily grind. Take nose off grindstone; be no man's slave, punch nobody's time clock. Own your business. I start you silvering mirrors, Plating tableware home. Sure income. Plans free. Clarence Sprinkle, Dept. 28, Marion, Ind.

WANTED—An Idea! Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write for "Needed Inventions" and "How to Get Your Patent and Your Money." Randolph & Co., Patent Attorneys, 620 F Street, Washington, D. C.

BE a Mirror Expert. Good income; spare time home at first; no capital; we train, start you making and silvering mirrors; French method. Free prospectus. W. P. Derr, Pres., 579 Decatur, Brooklyn, N. Y.

WANTED

WANTED—Old False Teeth. Don't Matter if Broken. We pay up to $15 per set. Cash sent by return mail. Goods held 10 days subject to sender's approval of our offer. Mazer's Tooth Specialty, 2007 S. 5th St., Phila., Pa.

$3.00 TO $60.00 per set paid for old, broken, false teeth. Bridgework 40c a tooth. Morrison, 310 West 144th St., N. Y. City.

WANTED, good mail order propositions. Medina Merchandising Co., Medina, Ohio.

FOR SALE

EDISON Motion Picture Outfit for sale. Simpkins, 333 Church, Roanoke, Virginia.

TIME Clock—International Second Hand Now in use. Wilson & Bennett Mfg. Co., Chicago, Ill.

ARMY and Navy Men, Attention! Field, Marine, Day and Night Glasses with case, 25-mile adjustment, only $9.50. Money back if not satisfactory. Weil's Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

6X TURNER-REICH Binoculars, $35.00; 6X B & L Stereo Binoculars, $60.00; Bush Prisma Monocle, $15.00; 8X Turner-Reich Binoculars, $35.00; 8X Bush Prisma Binoculars, $55.00. David Stern Company, in business since 1885, 1027 Madison Street, Chicago, Ill.

MEDICAL Books, Typewriter, Handcuffs, Shackles, Chains, Spirit Locks, etc. J. Trudel, 524 Moody, Lowell, Mass.

10 MILL'S Floor Vendors, $14 to $22, Operator's Bells, $12, Miscellaneous machines, $1 to $5, for quick sale. All like new. Auto Vending Co., Minneapolis, Minn.

3" BARDOU Telescope. Equatorial movement. Angle and 3 other eye-pieces; also other equipment, like new, $225.00. David Stern Company, 1027 Madison Street, Chicago, Ill.

UNIVERSAL Knitting Machines. Many styles, hand or power. For Catalogue, address, Daniel Bucker, Peabody, Mass.

TYPE and Printing Material at bargain prices. Now is the time to buy. All sizes rebuilt Job Presses very cheap. Catalogue free. Philadelphia Printers' Supply Co., 14 So. Fifth St., Philadelphia.

FOR Sale—Buffalo Lap Robe, in first-class condition. L. M. Birely, Union Bridge, Md.

SALE OR EXCHANGE

HAVE you anything to sell or exchange. Books, motors, dynamos, cameras, bicycles and miscellaneous objects? Advertise in "The Market for Exchange," a magazine which offers a market to everyone, everywhere. Rate 3 cents a word. Send 10 cents for sample copy to Publisher, Market for Exchange, 141 Milk Street, Boston, Mass.

GUNS, SPORTING GOODS, ETC.

BARGAINS. Will trade, buy or sell Guns, Rifles, Revolvers. Send Stamp for Bargain List. Oldest, most reliable Dealer in Country. Wm. R. Burkhard, 143 East Fourth Street, St. Paul, Minnesota.

BUY, sell, exchange old-time and modern Fire-arms. Antiques wanted. Stephen Van Rensselaer, 805 Madison Avenue, New York.

MACHINERY, TOOLS AND SUPPLIES

"RED DEVIL" Mechanic's Plier (drop-forged steel); most efficient. 5 inch size, 60c. Style 50. Tool circulars free. Smith & Hemenway Co., 97B Cott Street, Irvington, N. J.

PULLEYS, Gears, Sprockets, Shafting, Hangers. See page 146. W. A. Jones Foundry & Machine Co., Chicago.

FOR Sale—20 H. P., two-cylinder gasoline engine, heavy planetary transmission, tractor wheels, bevel drive, auto axle, portable drill, lever punch, 22" Walcott geared shaper. Arie Veenschoter, Pella, Iowa.

WIRE—all sizes—⅜ to No. 16. Coppered, tinned, galvanized and plain steel wire for sale. Cooley Mfg. Co., 553 W. Monroe St., Chicago, Ill.

MILLING machine, back geared, Lincoln type, with arbor and vise, overhauled, $90. Photo. Lucas & Son, Bridgeport, Conn.

ENGINES, MOTORS AND DYNAMOS

ELECTRIC Motors, 110 Volts, 60 cycle, A. C., Single phase, 1750 Speed, ¼ HP, $22.00; ½ HP, $42.00. Brand new, never unpacked, guaranteed perfect. Lincoln Supply Company, Lincoln, Penna.

ENGINE User Agents Wanted to use, demonstrate and sell "Big Ben," wonderful new 2½ H. P. gasoline engine. Free introductory offer and free details. C. Benninghofen & Sons, Dept. P, Hamilton, Ohio.

EXCEPTIONAL values, alternating and direct current motors from 1/30 H.P. upwards. All guaranteed for one year. Motors bought and repaired. Tell us your needs. Illustrated catalog supplies and motors. Hyre Electric Co., 633-AB South Dearborn St., Chicago.

ELECTRIC Motors. 110 Volts, 60 Cycle, A.C., Single Phase, 1750 Speed, ¼ HP, $22.00, ½ HP, $42.00. Brand new, never unpacked, guaranteed perfect. Lincoln Supply Co., Lincoln, Pa.

GENERATORS, Ball-bearing, 32 volt, 11 to 35 amperes, complete with base and pulley. Prompt shipments. Goodlite Company, Indianapolis, Ind.

SMALL Motors and Generators—Quantity ¼ H. P. A. C. Motors—110 volts—slightly used. $14.00. Small generators—charging—lighting—moving picture Arc machines, $10 each and up. A. C. Motors 1 and 3 phase up to 5 H. P. for immediate delivery. Write for Bankruptcy Stock sheet. Johnston, West End, Pittsburgh, Pa.

FLOUR & FEED MILLING MACHINERY

SPECIAL bargains in second hand Attrition mills, burr mills, crushers, corn shellers, bran dusters, dust collectors, purifiers, reels, double, single, 2 and 3-pair high roller mills, sieve bolters, receiving separators, scourers, etc. Write for description and prices. Sprout, Waldron & Co., P. O. Box 429, Muncy, Pa.

FOR MECHANICS

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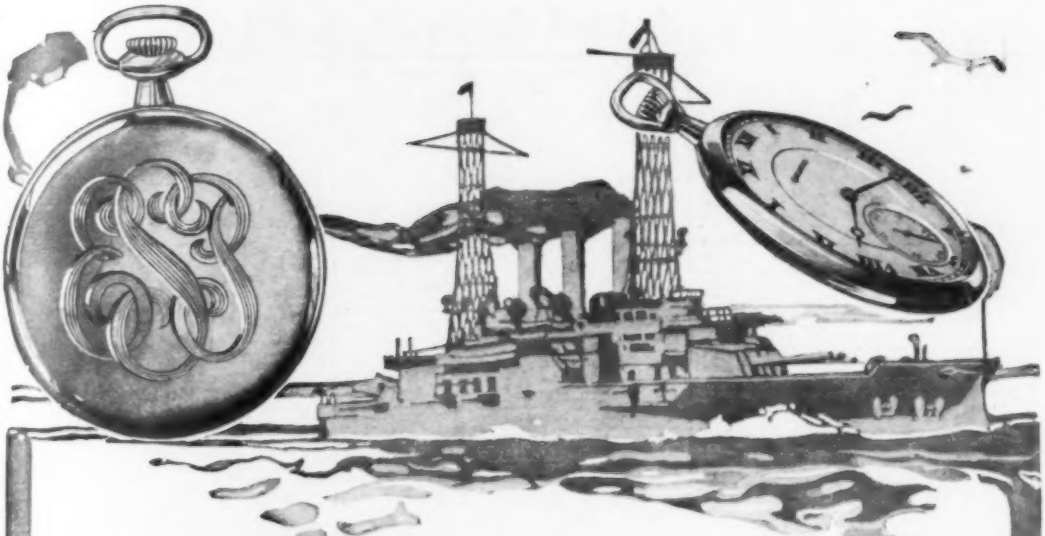

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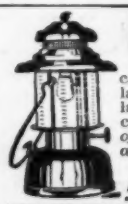

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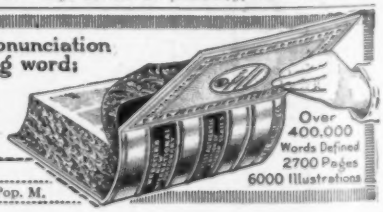

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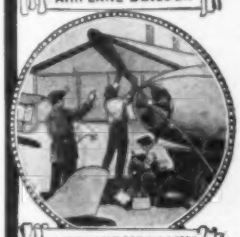

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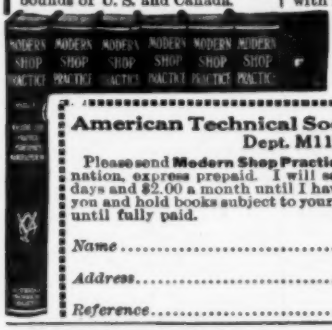

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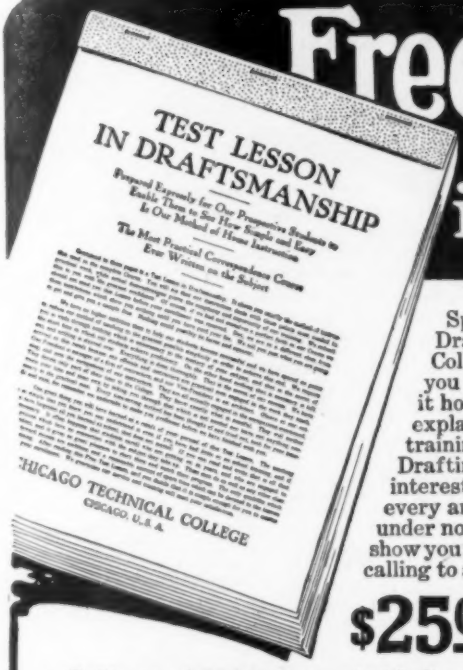

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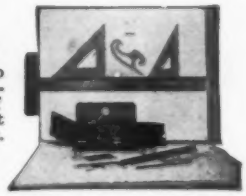

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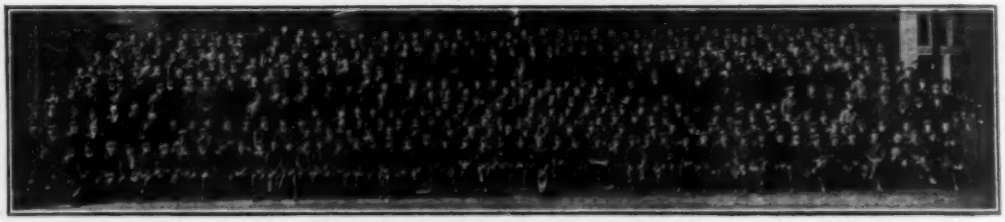

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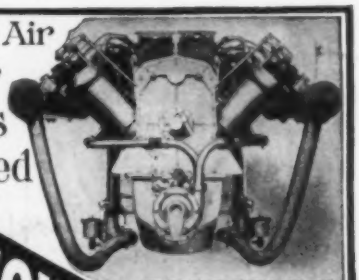

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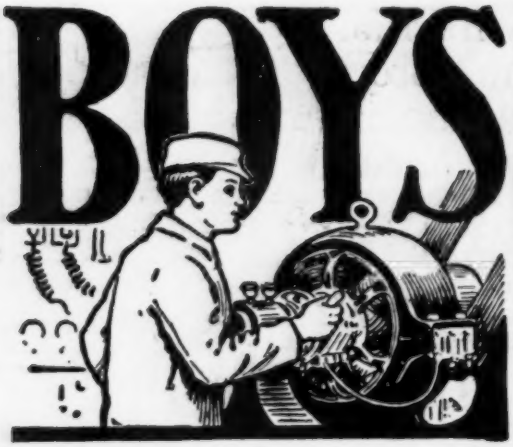

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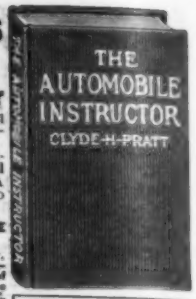

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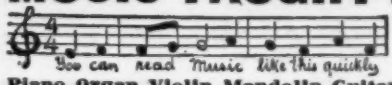

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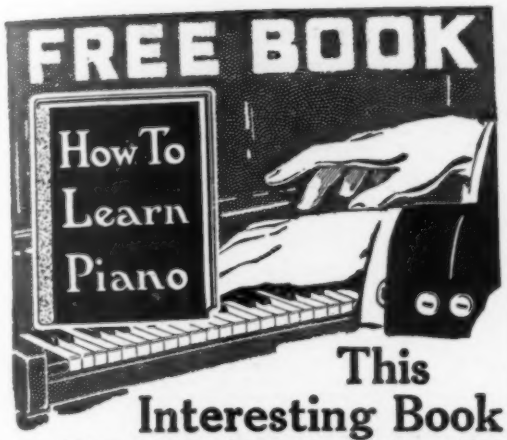

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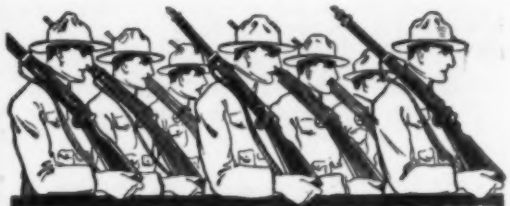

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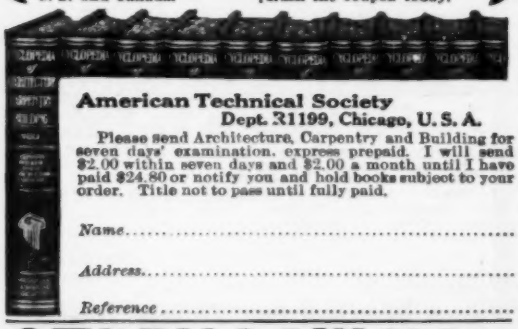

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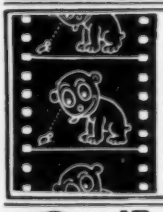

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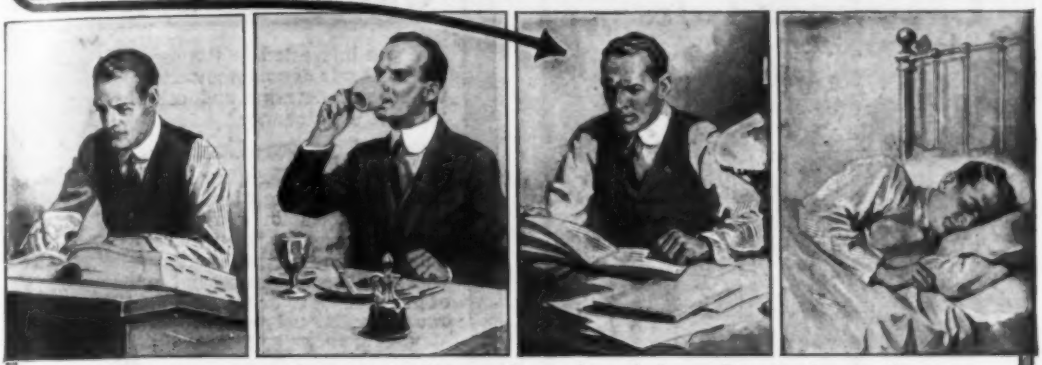

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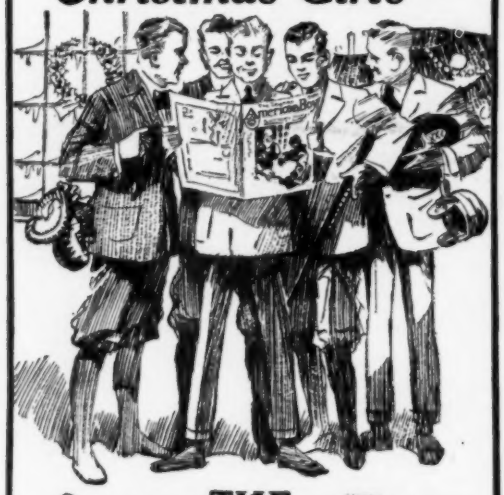

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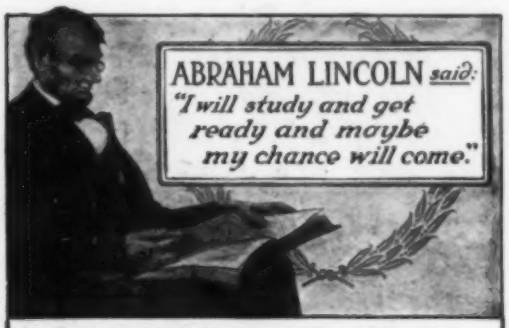

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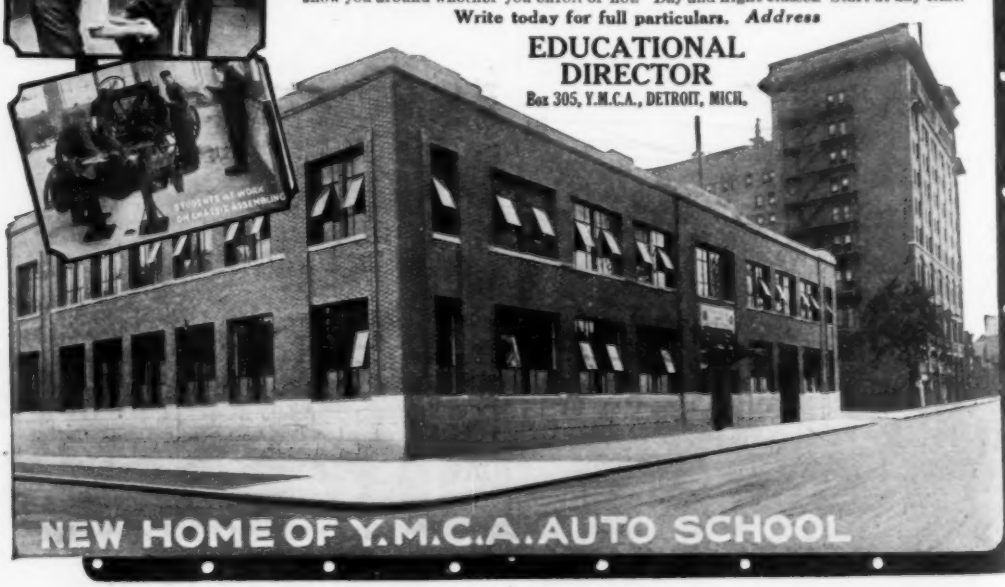

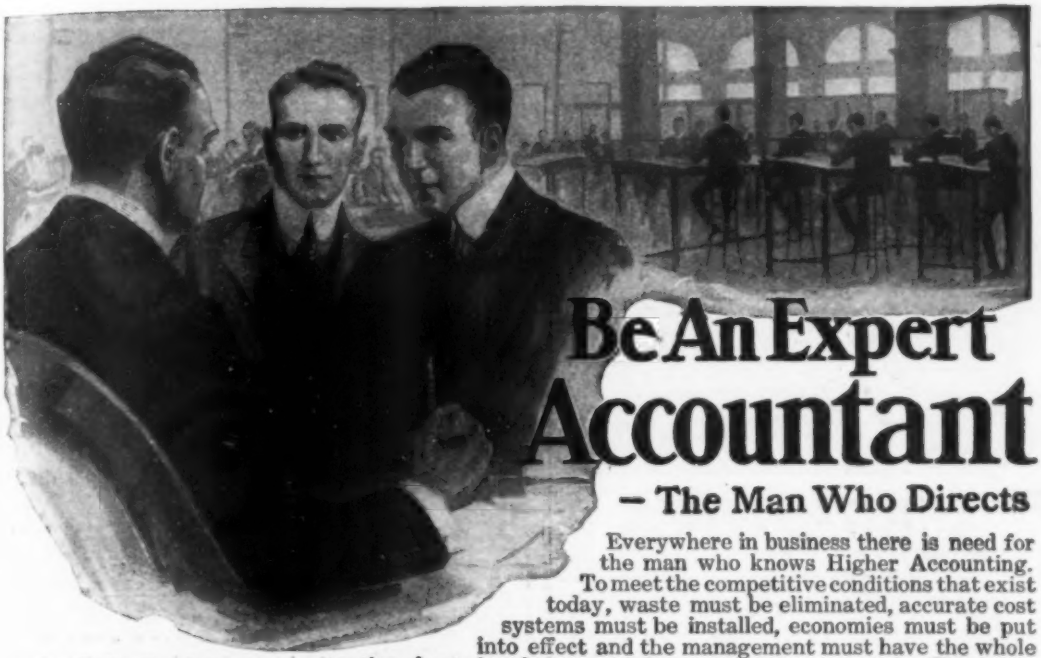

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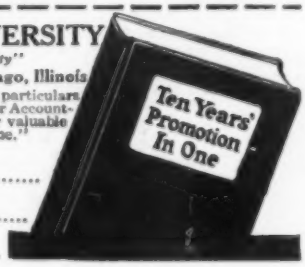

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It is just as easy to be a successful man in a live business as it is in one that holds little opportunity or chance for you. A man that thinks, knows that the automobile and tractor business is the livest business in the world. It has grown faster and has made more men big money and opened good positions for them than any other, and the best part of it is that the field is not crowded. In fact there are more chances for the average man today than in any other line of business.

Get in the Game!

There's money, lots of it, to be made, and you might as well make it along with the rest of the live men. Let this successful school, the one that has the reputation of turning out competent mechanics who are making good, give you the training that will start you toward success. It's easy. All it needs is determination and backbone.

I started teaching the automobile business nine years ago, with $60 and a training in mechanics, the best which was to be had in those days. My success has been that I came out with the idea that no man could learn a mechanical business without actually doing the work. Textbooks and charts and lectures are all right for some lines of education, but not in mechanics. Here you get right down in the work, and you know as well as I do that when you once do a thing, you know it.

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Don't Experiment Get in a business with a future, and learn it where success is assured. All it needs is application on your part.

Write Today for My Big, Fully Illustrated Catalog showing pictures of every department in my school and just how we teach you this business, and then decide your future. This is the day of big opportunities for mechanically inclined men. **Write to me today.** I will show you a sure road to success.

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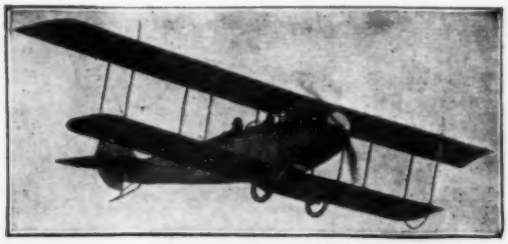

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Men Who Know the Science of Aviation!

The fact that the United States government plans to send 30,000 flying men to Europe and spend possibly a billion dollars in aviation means something more than a big demand for flying men.

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- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Gas Engine Operating
- ☐ CIVIL ENGINEER
- ☐ Surveying and Mapping
- ☐ MINE FOREMAN OR ENGINEER
- ☐ Metallurgist or Prospector
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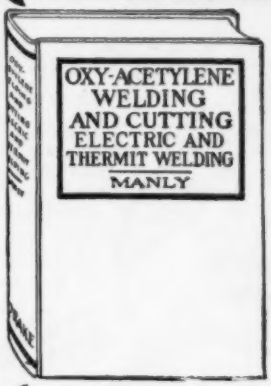

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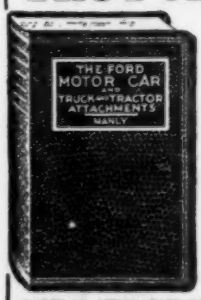

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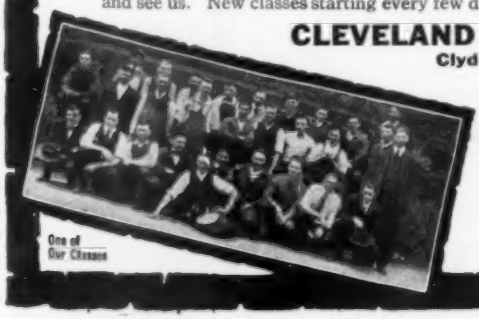

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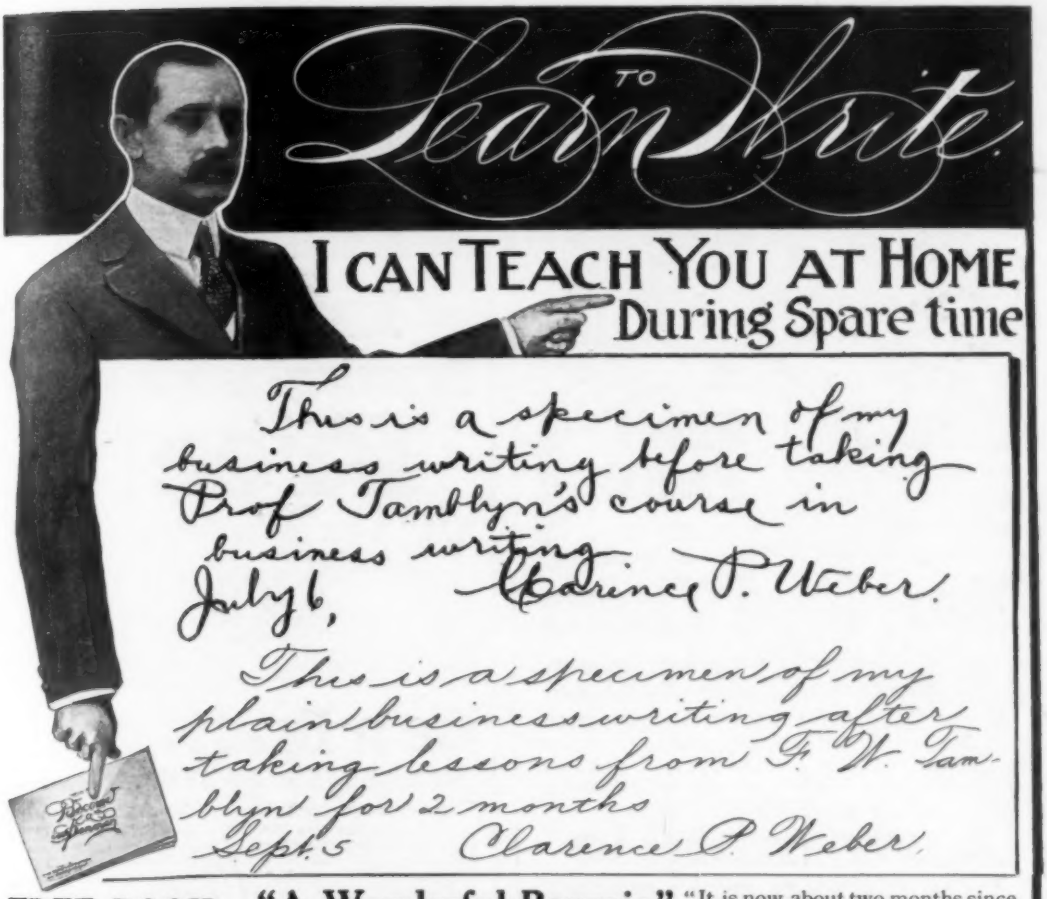

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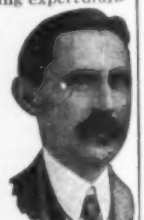

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Why $5,000 Salaries are Common in this New Two Billion Dollar Industry

By M. B. Sackheim

A CONCERN in South Chicago had been shipping, daily, about 200 cars of Coke from Connellsville to their smelters. Some time ago a traffic expert succeeded in getting a rate judgment which resulted in a saving of about $5.00 on each car. Thus, on this one item alone a saving of over $300,000 a year was effected.

In St. Louis, through misrouting of freight, errors in reconsigning cars and undercharges on shipments, a railroad lost over $27,000.

A traffic expert discovered that freight rates paid by the Meeker Coal Co. were exorbitant. A ruling secured from the Interstate Commerce Commission resulted in a refund of $122,000.

An oil shipper in Kansas was losing over $30 every day—$700 monthly—because he did not know of certain tariff regulations entitling him to lower rates.

These are but a few instances of what is occurring every day in the traffic industry. Tens of thousands of concerns, without realizing it, are losing fortunes every year because they do not know that there are countless classifications, special freight services and rate combinations which legally entitle them to rates that would amaze them if they but knew.

Is it any wonder that competent traffic experts are paid $2,500 to $10,000 and even up to $25,000 and $40,000 a year? Is it any wonder that firms are glad to pay a percentage of what traffic managers save? The man who can do it is in high command and instead of finding himself in the position of ever asking for a raise generally has several firms bidding for his services. Why not? It's no hardship to pay a big salary out of losses turned into profit.

Traffic—The Life-Blood of Business

Transportation is the second largest and the most important business in the country. More than two billion dollars annually are spent in freight rates, yet it has been estimated that eight out of every ten shippers are losing money because of the scarcity of trained traffic men.

Every dollar wasted in freight charges represents a dollar of wasted profit or a dollar of wasted opportunity. In business today freight charges are a vital factor in governing prices. By accepting every existent advantage in rates, a concern, or a city, can vastly undersell its competitors who waste traffic dollars.

So vital is this element of freight charges that the Chicago Board of Trade pays its traffic manager about $12,000 a year to protect the members of the board from freight-rate losses.

By having rates properly based, competent railroad-traffic managers influence shipments over their lines, and for this work they are paid from $6,000 to $45,000 annually.

There are about 50,000 large business corporations and about 400,000 smaller shippers which must be protected by competent traffic men. These concerns have freight expenses running from a few thousand dollars to many thousands of dollars monthly. Yet in the entire country there are only a few hundred men actually competent to save the money now being wasted through lack of efficiency in applying the Government Freight Rate System. It is estimated that over 100,000 more traffic experts are needed at once.

Become a Traffic Expert

Heretofore, there has been no simple way to master the details of traffic management. Realizing the crying demand for trained traffic experts, and seeking relief, the American Commerce Association—a National organization OF traffic men, FOR traffic men, BY traffic men, offers to give men the training required to make them competent to handle the problems of most economical distribution. The instruction is given by mail and can be studied in sparetime, at home. Though the most complete and thorough training is given, the Course is remarkably easy to master.

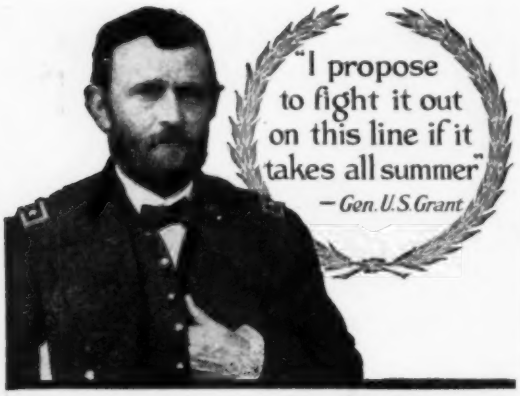
Through its Advisory Council, every member of the American Commerce Association receives the help of such men as T. Albert Gantt, traffic manager, Corn Products Co.; Wm. Scott Cowie, freight agent Erie R. R.; Samuel G. Lutz, general traffic manager Stone & Webster Engineering Corporation; A. C. Westfall, traffic manager Cadillac Motor Car Co.; T. T. Harkrader, traffic manager American Tobacco Co.; as well as nearly 200 others of equal prominence.

Wonderful Book, Free

The Course in Traffic Management is adjusted to beginners as well as to those already engaged in traffic work. The instruction has been endorsed by such men as Robt. H. Forbes, traffic manager Butler Bros., New York; J. F. Brown, manager transportation department Chicago Board of Trade; H. G. Wilson, traffic manager of the Toledo Board of Trade; Ira S. Bassett, traffic commissioner Pittsburg Commercial Club; W. H. DeWitt, Eastern traffic manager Western Electric Co., and hundreds of others equally prominent.

It is impossible to go into details in this limited space, but the Association has published a remarkable book for free distribution which explains the instruction in detail and tells how anyone may quickly learn the cheapest rates in existence on all kinds of shipments, the fastest methods of shipment, the best methods of protecting shipments from loss and damage, and how to organize and manage a traffic department for maximum results. The book also tells what hundreds of other men have accomplished as a result of the study.

The new profession of traffic management is in its infancy. The possibilities today—great as they are—are nothing compared to what they will be a year from now. If you are at all interested in getting into this highly profitable field, paying salaries of $2,500 to $10,000 and more, be fair to yourself and write for the remarkable book now offered free by the Association. In writing, please state whether you are a beginner or whether you have had previous traffic experience, and give your present age and occupation. Address, American Commerce Association, Dept. 1012, 206 S. Wabash Ave., Chicago, Ill. (American Commerce Building.)



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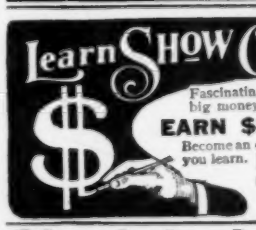

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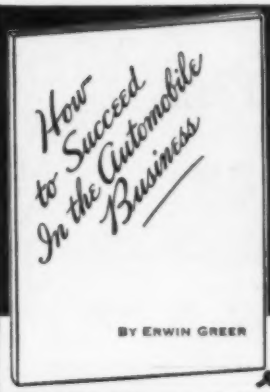

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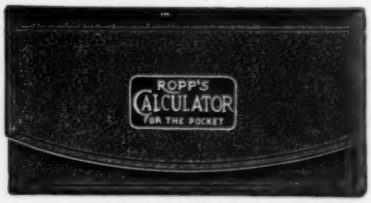

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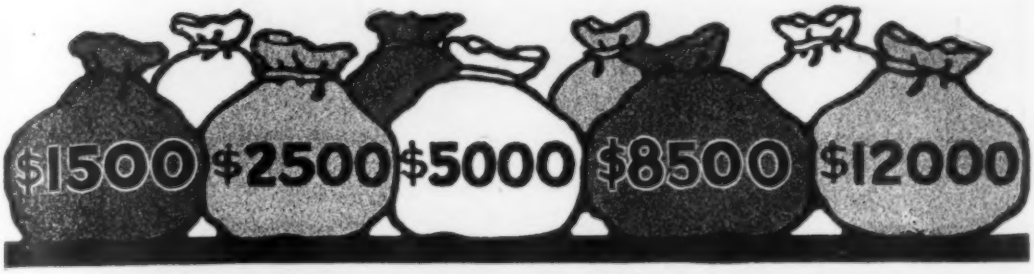

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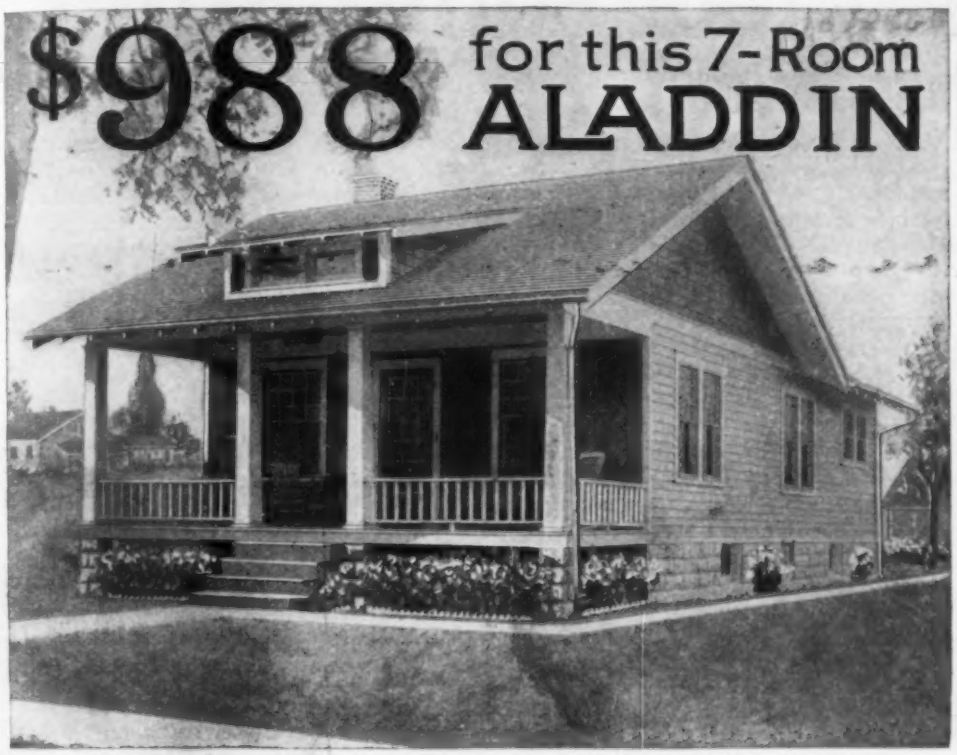

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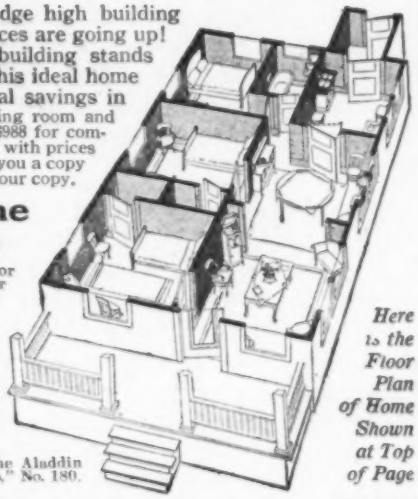

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A YOUNG man in the East had an article for which there was a nation-wide demand. For twelve years he "puttered around" with it, barely eking out a living. Three years ago he began to analyze himself. He discovered that his one great fault was his inability to come to a quick, definite decision. Time and again he had tried, in a half-hearted way, to market his goods. This time he steeled himself to fight a winning battle. He began to develop his strength of will so that no imaginary mountain could turn him aside from his purpose.

From $30 to $1,000 a Week

Today this young man is worth $200,000. He is building a $25,000 home—and paying cash for it. He has three automobiles. His children go to private schools. He goes hunting, fishing, motoring or traveling whenever the mood strikes him. His income is over a thousand dollars a week and he attributes his amazing success to his super-developed power of will.

A School-Teacher's Rise

A teacher in a little town just outside of Chicago was so "down and out" that he couldn't pay a $10 debt which he had contracted months before. Every cent he had scraped together had been lost through an investment in a corporation that failed to make good. Discouraged, sick at heart, he was forced to do something quickly to recoup his losses. He secured a position in a small private school, and in a remarkably short time was the owner of it. As he says, "I am the owner of a business worth many thousands of dollars and owe no man a cent." Talk to him and he will tell you what his newly revived strength of mind has done for him!

A Failure at 60—Then Sudden Success

In a little town in New York lives a man who two years ago was pitied by all who knew him. From the time he was 14 he had worked and slaved—and at 60 was looked upon as a failure. Without work, in debt to his charitable friends, with an invalid son to support, the outlook was pitchy black.

Then, suddenly, things began to happen. He went to the owner of an old vacant factory, secured the place at a ridiculously low rent, with the first three months' rent free. He almost *demanded* a loan of $500 with which to begin some experiments. In three weeks he was out for business. In three months his plant was working day and night to fill orders. During 1916 the profits were $20,000. During 1917 the profits, it is estimated, will run close to $40,000. And this genial 62-year-young man is enjoying pleasures and comforts he little dreamed would ever be his.

Ask him what made the remarkable change in his life and he will tell you that it was his life-and-death determination to whip *his own mind*—so that he could do the things he wanted to do without being hampered by a weak, milk-and-water will.

Former Newsboy Heads $1,000,000 Business

From "peddling papers," to the management of a concern doing business of over a million dollars a year, is a far cry indeed. Yet

that is the remarkable achievement of a 26-year-old youth from the West. Born of Russian parents, raised in a tenement, with no education save that gained in the ordinary grade school, this young business giant forced his way to the front rank of his profession. For a while after he stopped selling papers he drifted around from job to job. Two years ago he made his present connection. Today he drives around in his own motor-car, his income is almost unbelievable when one considers the handicaps he had to overcome, and his prospects for "five-figure" yearly earnings are exceedingly bright. He disclaims all credit for his success—stating that it was only through systematically developing his personality and will-power that he was able to make his way so rapidly.

Their Guide to Wealth

These are but a few of the hundreds of achievements brought about through systematic will-power development. Regardless of what a man may be—what failures he may have gone through—he can have practically anything he wants out of life if he will but use and develop his God-given power of will. For will-power is the secret of every great achievement. It makes weak men strong. It makes leaders out of followers. It makes doers out of dreamers. It makes dominating personalities out of cringing wrecks of humanity. It makes successes out of failures. It makes dollars jingle where only pennies clinked before.

And the most wonderful thing about a strong will is that it may easily be acquired by anyone. Prof. Frank Channing Haddock—a scientist whose name ranks with James, Bergson, and Royce—after 20 years of research, investigation and study, has prepared a remarkable set of actual exercises, lessons and new methods which have already revolutionized the lives of over 200,000 men and women in all parts of the world. This book, called "Power of Will," is issued by the Pelton Publishing Co. of Meriden, Conn. Mr. Pelton has authorized me to say that any reader who cares to examine the book may do so without sending any money in advance. In other words, if after a week's reading you do not feel that this book is worth $3, the small sum asked, return it and you will owe nothing.

When you receive your copy for examination I suggest that you first read the articles on: The law of great thinking; how to develop analytical power; how to perfectly concentrate on any subject; how to guard against errors in thought; how to drive from the mind unwelcome thoughts; how to develop fearlessness; how to use the mind in sickness; how to acquire a dominating personality.

No Money in Advance

Some few doubters will scoff at the idea of will-power being the fountainhead of wealth, position and everything we are striving for, and some may say that no mere book can teach the development of the will. But the great mass of intelligent men and women will at least investigate for themselves by sending for the book at the publisher's risk. I am sure that any book that has done for thousands what "Power of Will" has done, is well worth investigating.

It is interesting to note that among the 200,000 owners who have read, used and praised "Power of Will" are such prominent men as Supreme Court Justice Parker; Wu Ting Fang, ex-U. S. Chinese Ambassador; Lieut.-Gov. McKelvie, of Nebraska; Assistant Postmaster-General Britt; General Manager Christeson, of Wells-Fargo Express Co., E. St. Elmo Lewis; Governor Arthur Capper of Kansas, and thousands of others.

As a first step in will training, I would suggest immediate action in this matter before you. It is not even necessary to write a letter. Use the form below, if you prefer, addressing it to the Pelton Publishing Company, 13-W Wilcox Block, Meriden, Conn., and the book will come by return mail. This one act may mean the turning point of your life, as it has meant to me and to so many others.

PELTON PUBLISHING COMPANY,
13-W Wilcox Block, Meriden, Conn.

I will examine a copy of "Power of Will" and I agree to remit $3 or remail the book in five days.

Name .....

Address .....

.....

WHITE MONOPLANE

A Proved Success

FLIES WITH MOTORCYCLE ENGINE

Think of flying with an ordinary twin cylinder motorcycle engine! This is the only aeroplane that will do it. It is the smallest and most efficient of all aircraft. No longer is flying the sport of acrobats and millionaires. Men and boys! Build one of these remarkable aeroplanes with ordinary tools in a few weeks and learn to fly at home with safety. No shop is needed. If you can use a hammer, saw and a pair of pliers and have a shed, barn, a basement or a back yard you can build one of these remarkable flyers for a few dollars and in spare time if necessary. Costs less than 1/50 the cost of the average aeroplane and can be built for less than a fifth the cost of going to a flying school. It is the smallest, simplest, safest and most successful aeroplane in the world.

YOU CAN BUILD IT

Remember, this is not a toy or an experiment, but a thoroughly perfected man-carrying aeroplane with 18 foot spread and a speed of 30-60 m.p.h. Lifts 190 pound man with twin cylinder motorcycle engine. Flights of several hours can be made. Hundreds are already in use in the United States, Canada, Mexico, South America, England, Australia and the Philippine Islands. Hundreds of amateurs are building and flying these aeroplanes, men and boys who knew absolutely nothing about aeroplanes and flying before. It is the simplest and safest flyer in the world. Any make of motorcycle engine can be used.

WHAT OTHERS SAY:

POPULAR MECHANICS says:
"Undoubtedly the smallest successful monoplane in the world."

AERIAL AGE says:
"One of the most interesting machines yet to be developed."

SCIENTIFIC AMERICAN says:
"A unique type of monoplane."

L. A. EVENING HERALD says:
"Has solved the problem of producing small machines at a cheap price for universal service."

USE THIS COUPON

George D. White,
Dept. 14, 3832 So. Main St.,
Los Angeles, Calif.

DEAR SIR: I am enclosing $2. Send me a full set of working drawings of your famous monoplane, charges prepaid.

Name.....

Address.....

.....

Working Drawings $2

Send $2 at once for a complete set of working drawings of this wonderful monoplane showing all details and dimensions in a simple manner so you can easily understand everything. Here is your chance to get into the greatest of all industries. Thousands of experienced flyers and builders are needed.

Don't Miss This Chance! Send $2 Now!

GEORGE D. WHITE

DEPT. 14

3832 South Main Street, LOS ANGELES, CALIF.

The Men The Navy Needs Now

DURING the first few weeks after the United States entered the Great War, many thousands of patriotic young Americans responded to the call of the United States Navy. So many of these fine young men offered their services who had no special qualifications for the work on board ship, that the capacities of the training stations were soon overtaxed. It shortly became necessary to restrict the enlistments of unskilled men by raising the minimum age limit of apprentice seamen, and to suspend enlistments in certain trades which were in excess, such as shipwrights, shipfitters, blacksmiths, boilermakers, plumbers, printers, painters, general electricians and yeomen (or clerks).

The Navy still needs men, but desires to fill the remaining vacancies in its authorized complement with men who are most needed in the fleet.

There is a demand now for competent machinists, ages 21 to 35; for cooks and bakers, 21 to 35 (or landsmen for cooks and bakers, 18 to 25); and for radio operators, 18 to 25.

Other ratings which are still open to enlistment are apprentice seamen, musicians, coppersmiths, firemen, hospital apprentices, mess attendants, and men specially qualified for machinists in the Navy Flying Corps.

An attractively illustrated booklet explaining the naval service, together with circulars describing special brancnes of the Navy, will be sent upon request.

ADDRESS

RECRUITING DIVISION

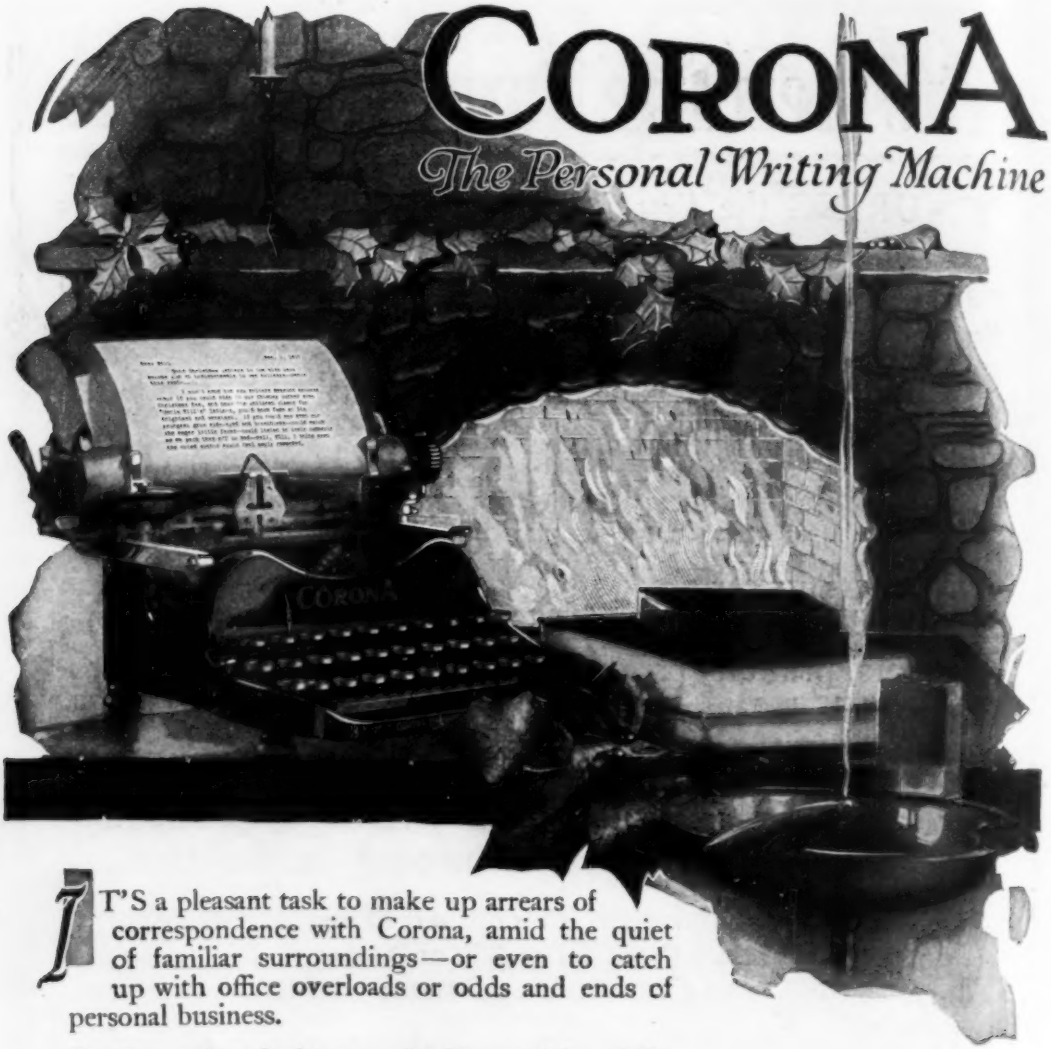
NAVY DEPARTMENT WASHINGTON, D.C.

There is a Navy Recruiting Office in every large city

[*NOTE—This page contributed by Popular Mechanics Magazine.—Editor.*]

CORONA

The Personal Writing Machine



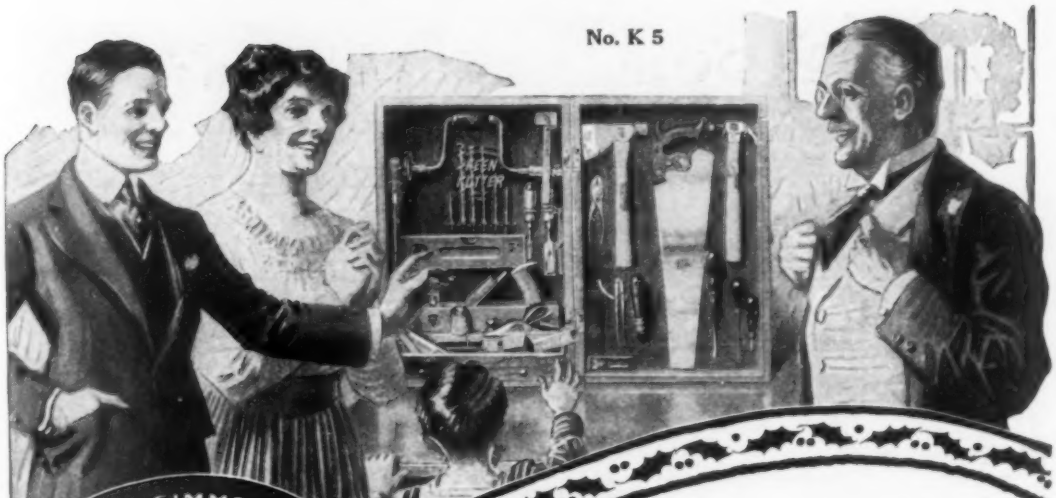
IT'S a pleasant task to make up arrears of correspondence with Corona, amid the quiet of familiar surroundings—or even to catch up with office overloads or odds and ends of personal business.

For Corona is truly the *personal* writing machine. It fits the home atmosphere, the home mood—even fits into your favorite nook as cosily as a comfortable chair. Light in weight, readily portable, and never in the way, for it *folds* into small compass—yet sturdily built and thoroughly practical, as a hundred thousand users will testify. Also exceptionally simple to operate.

Corona weighs but six pounds; complete with neat traveling case, it costs fifty dollars. A useful gift, for men or for women, and one that steadily grows in value. Fully described in Booklet No. 13. Also supplied with smart special luggage, made by Likly.

CORONA TYPEWRITER CO., INC., GROTON, N. Y.
NEW YORK CHICAGO SAN FRANCISCO
AGENCIES IN ALL PRINCIPAL CITIES

-fold it up-take it with you-typewrite anywhere



E. C. SIMMONS
KEEN KUTTER
CUTLERY AND TOOLS

"—and here's our present to you, Dad"

Just imagine how happy dad would be with a KEEN KUTTER Tool Cabinet. Think of all the odd jobs he does about the house for mother—an extra shelf, a door to hang, a new cupboard or closet and a hundred and one little things around the barn and garage.

Give him a KEEN KUTTER Tool Cabinet for Christmas and he'll always be prepared to tackle any little odd job about the house—know right where to find every tool.

And he'll know that KEEN KUTTER Tool Cabinets are filled only with highest grade, tested tools because every tool is guaranteed to give satisfaction—*or your money back*. Ask your dealer to show them to you.

SIMMONS HARDWARE COMPANY

Manufacturers and Distributers

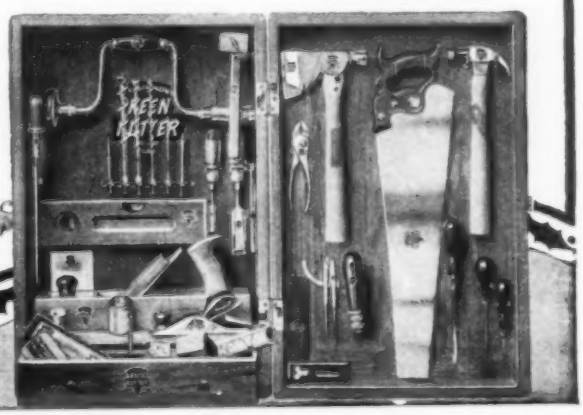
St. Louis New York Philadelphia Toledo Minneapolis Sioux City Wichita

No. K5 Price $35.00

Complete with 28 Highest Grade Tools and 12 other miscellaneous articles.

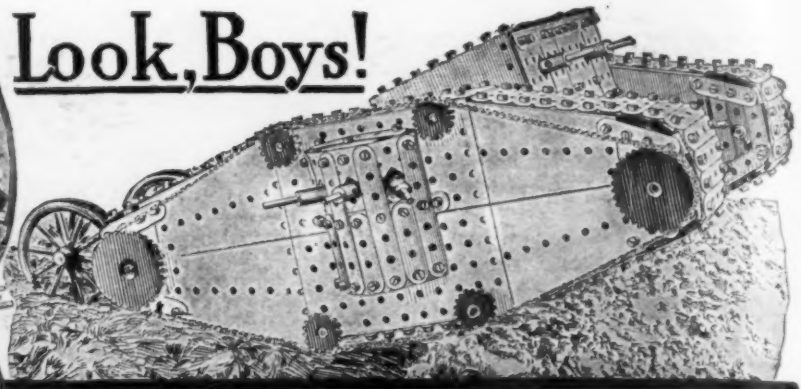
"The recollection of QUALITY remains long after the PRICE is forgotten."

Trade Mark Registered —*E. C. Simmons*



Look, Boys!

A set of Meccano is just like a Magic Box of fun!



You Can Build This TANK with MECCANO

Toy Engineering for Boys

Think of the never-ending joy of building with Meccano! You can construct Towers with electric elevators, Cranes that lift loads, Bridges that open and close, Steam Shovels that dig, Looms that weave, Clocks that keep time.

Or—you can reproduce the machines you see everywhere around you. There's no limit to what you can do. Why, it's almost magic! You can actually have a new toy every day.

The "Tank" shown above is a perfect working model of the wonderful machines which crawl over trenches and shell-holes, knock down trees and houses, and climb right over them. Yet it's only one of the hundreds pictured in the Meccano Manuals, which come with the Meccano sets. Each page is a fund of wonder; each model an inspiration.

Send For Meccano Wonder Book

Send the name and address of yourself and three boy friends and you will receive the Wonder Book, telling all about Meccano; a free trial subscription to "The Meccano Engineer;" and terms of $1,000 Prize Contest. Send now, so you and Dad can decide on your present.

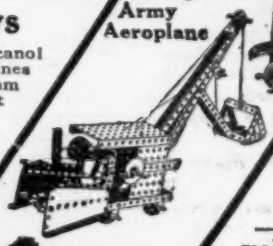
A bully Field Gun

You can make a new model every day with Meccano if you want to. You never get tired of Meccano, and it never wears out.

Be Sure the Name "MECCANO" is on the Box

A few of the Hundreds of Models Any Boy can Build With Meccano.

A regular Army Aeroplane



A Steam Shovel that digs

A dandy Crane that lifts

Insist on Meccano for Chrismas Because:

—Meccano Building is True Engineering.

—No Other Toy will make such Fascinating Models.

—Meccano Models operate like Real Machinery.

—You don't need to Study; the Fun begins when you open the box.

—There is no Limit to the Number of Models any Boy can Construct.

—Each Set is Complete; nothing more to Buy.

—You can Win a Big Cash Prize.

BE SURE YOU GET MECCANO

Be sure to get MECCANO. There isn't anything else just as good or just the same. So say the name over to yourself—MECCANO—MECCANO—MECCANO. Then tell Mother and Dad why nothing else will give you as much fun.

Prices of MECCANO Sets

MECCANO sets include various sizes of dandy girders, plates, and perforated strips; also nuts, bolts, wheels, gears and scores of other parts—all cut from shining steel and brass, as accurately as the works of a clock.

Each regular outfit, from No. 00 to No. 6, is complete with tools and full instructions. Nothing more to buy. Sets numbered 1X, 2X, 3X contain the powerful MECCANO Electric Motor. Any set sent postpaid upon receipt of price, if not at your dealer's.

No.	00	$1.00
No.	0	1.50
No.	1	3.00
No.	1X	4.50
No.	2	6.00
No.	2X	7.50
No.	3	9.00
No.	3X	12.00
No.	4	15.00

And up to $40.00

MECCANO COMPANY, Inc.
Building 10H, Bush Terminal, Brooklyn, N. Y.

Make this Christmas "the best ever" for your boy

You remember, don't you, how much you wanted a gun, how discontented you were till you got it? And will you ever forget how proud and happy you felt the first time you fitted the stock of your *own* Winchester to your shoulder and fired your first shot? Well, that lad of yours wants a rifle of his own just as badly as you ever did and—

Now's your chance to make him happy

Christmas is the time to make his most cherished dream come true, and that Winchester .22 will give him more pleasure this year than a whole arsenal of them could possibly give him five years from now. So make him happy while you have such a good chance.

A rifle is a wise gift, too, because it brings out the man in him; it teaches him responsibility, self-control, self-reliance; it develops in him the invaluable qualities of concentration and perseverance.

Every boy knows the reputation behind the name "Winchester," so get him the rifle he can be most proud of.

What the name "Winchester" means

The name "Winchester" stands for the best in gun making. For over half a century Winchester has been the standard of pioneers and sportsmen.

The Winchester Company today is an organization of expert gun makers with 50 years of gun-making reputation behind it.

Every gun or rifle that bears the name "Winchester" is fired many times for smooth action and accuracy, and is fired with excess loads for strength.

Get the rifle now

Your dealer will help you to decide which one of the fine .22 Winchesters will best suit your boy. Now is the time to select it—while there are still plenty in stock. You will be surprised to find what a fine gun you can get for a low price. Get the rifle now and make the boy happy.

There is a place near you, either out in the open or at a club, where you can shoot. If you do not know where to shoot, write to us, and we will tell you where and how you can, or we will help you organize a club.

WINCHESTER REPEATING ARMS CO.
Dept. 145 New Haven, Conn.

Boys and Girls

Winchester Medals for skill with the rifle

The Gold Plated "Sharpshooter" Medal goes to the boy or girl under 18 who makes the first grade score with a Winchester .22 rifle and Winchester ammunition.

The Silver Plated "Marksman" Medal goes to the boy or girl who makes the second grade score.

Go to your dealer today; he will give you a sample target and booklet explaining the full conditions of the contest. This booklet also tells you how to get the best results from your Winchester. The dealer will also supply you with targets.

If your dealer cannot supply you, write to Winchester Repeating Arms Co., Dept. 145, New Haven, Conn.

MODEL 06. Take-down Repeating .22 caliber rifle, 20-inch round barrel. Shoots three sizes of ammunition. The most popular .22 caliber repeater ever placed on the market.

Take-down .22 caliber single shot rifle. A low priced, light-weight gun made in two sizes.

WINCHESTER

World Standard Guns and Ammunition

Please Mention Popular Mechanics

Science Gave Us Radiolite

Radium is a comparatively new scientific discovery. Now the world's greatest watch factories have utilized Radium to make a substance for illuminating Ingersoll hands and figures. This substance has been named Radiolite. The only watches that can be Radiolites are Ingersoll Watches.

Radiolite hands and figures double the usefulness of the Ingersoll Watch–and the Ingersoll has long been the utility watch of the world.

Radiolite glows brightly at night. It makes the hands and figures of Ingersoll Radiolite Watches plainly visible in pitchy darkness. It is self-luminous — unlike phosphorescent paint, which can only absorb light and later throw it off.

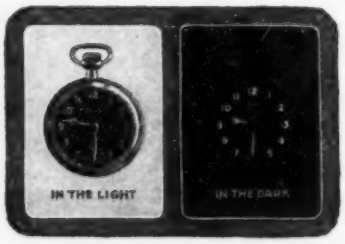
Buy an Ingersoll Radiolite Watch. Own a proven time piece that has been perfected by one of the greatest discoveries in the history of science. Let radium tell you every minute of every hour of every night at a glance.

Look for Ingersoll on the dial—for only Ingersolls are Radiolites.

ROBT. H. INGERSOLL & BRO.

New York Boston Chicago San Francisco Montreal

Radiolite—$2.25
In Canada $2.50
The regular Ingersoll with a radium-lighted dial



Waterbury Radiolite $4.50
In Canada $4.50
A small, handsome jeweled watch

Ingersoll

RADIOLITE WATCHES

$2.25 to $4.50

Illustrations three-fifths actual size

Please Mention Popular Mechanics

FREE TRIAL OFFER

Be Your Own Salesman and Save $51—

New Oliver Typewriters for $49

Let us send you a brand new Oliver Nine—the world-famous typewriter—for five days' free trial. Keep it or return it.

That is our plan in a nutshell. Our new plan—besides saving you $51—makes it easy for every one to convince himself of Oliver superiority. No red-tape—no money down—no C. O. D. No salesman to influence you. No need to ever pay $100 for a typewriter again.

But here is a warning—all advertisements for *brand new* Oliver Nines at $49 must be signed by the Oliver Typewriter Company.

Prices Cut in Two—and Why

With greater production and huge financial resources, the Oliver Typewriter Company is the pace setter.

Its officials seek to relieve the public of a useless tax. In the past, it has cost $51 to sell typewriters through an expensive sales force—high rents for offices in 50 cities—and other frills. All are wasteful from an economic viewpoint. That is why Oliver Nines are shipped direct from the factory to the user—on free trial. This permits us to wholesale machines to you for $49. You get the saving. No middlemen with their tolls.

This plan, we feel sure, is in keeping with modern demands. All will welcome such a sincere effort to reduce the High Cost of Typewriters.

This Is Our Offer

No Money Down. No C. O. D. Easy Monthly Payments

Maker and user deal direct. You are your own salesman. You pay yourself the $51. Own this master typewriter at the rate of $3.00 per month.

The Oliver Nine itself must convince you. It is the greatest, the most durable, the most successful typewriter ever built. No finer can be bought for any price. It is a twenty year development.

There is no need now to ever pay $100 again for a new typewriter. The Oliver rebellion gives everyone an opportunity to own an Oliver. And at lowest time payments.

This is the same machine used by the largest concerns. It has all the latest improvements. For speed and fine workmanship, it can't be beat.

If after trial of 5 days, you are not satisfied—ship it back at our expense.

MAIL TODAY

Over 600,000 Sold

Do Not Confuse

This $49 Oliver is *not* a second-hand machine—but brand new, direct from the factory to you. It is not a special model—but the identical machine that was $100. Reduced selling expenses saves you $51.

Some of the big concerns using Olivers are: U. S. Steel Corp., Standard Oil Co., Nat'l City Bank of N. Y., Montgomery Ward, Pennsylvania R. R. The Oliver is famous the world over. You can now own one for 10c per day.

10 Cents a Day

Easy payments of $3.00 per month. This in addition to our cutting the price in two. Could any one go further? Yet we offer this free trial without obligation on your part. The plan is daring—but we believe discerning people will respond.

This is the first time in history that a new, never-used $100 typewriter of the latest model has been offered at the price of cheaper or second-hand machines. It is cheaper to own than rent.

No Money Down

Simply send in the coupon properly filled in. There is no red tape—no salesmen—no collectors—no bother. Keep the Oliver for $3.00 per month. Or return it. It is up to you.

Mail the coupon today.

The Oliver Typewriter Company
1099 Oliver Typewriter Bldg., Chicago

FREE TRIAL COUPON

THE OLIVER TYPEWRITER CO.
1099 Oliver Typewriter Bldg., Chicago

You may send me a new Oliver Nine on approval. I will keep it five days. Then, if I decide to buy it, I will pay $49 at the rate of $3 per month. The title to remain in you until fully paid for.

If I decide to return it, I will turn it over to the express company, properly packed and addressed to you.

Name .....

Address .....

References .....

.....

The key to a keen and cheerful old age is vigor.

ANHEUSER-BUSCH'S

Malt-Nutrine

REG.U.S.PAT. OFF. TRADE MARK

Liquid-Food-Tonic

is strengthening. It benefits the old and weak —aids digestion and nourishes without overburdening the system. Is there a birthday in *your* home whose celebration crowds the cake with candles? Malt-Nutrine should be taken at each meal and before retiring.

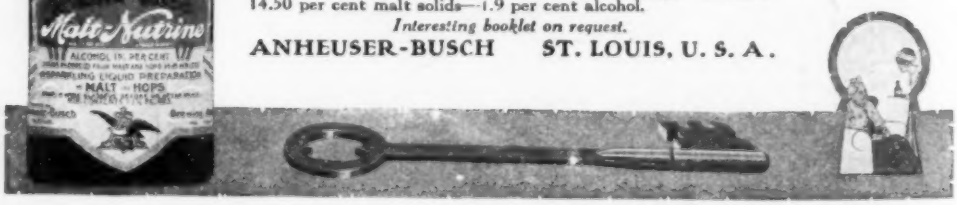
The key to the situation

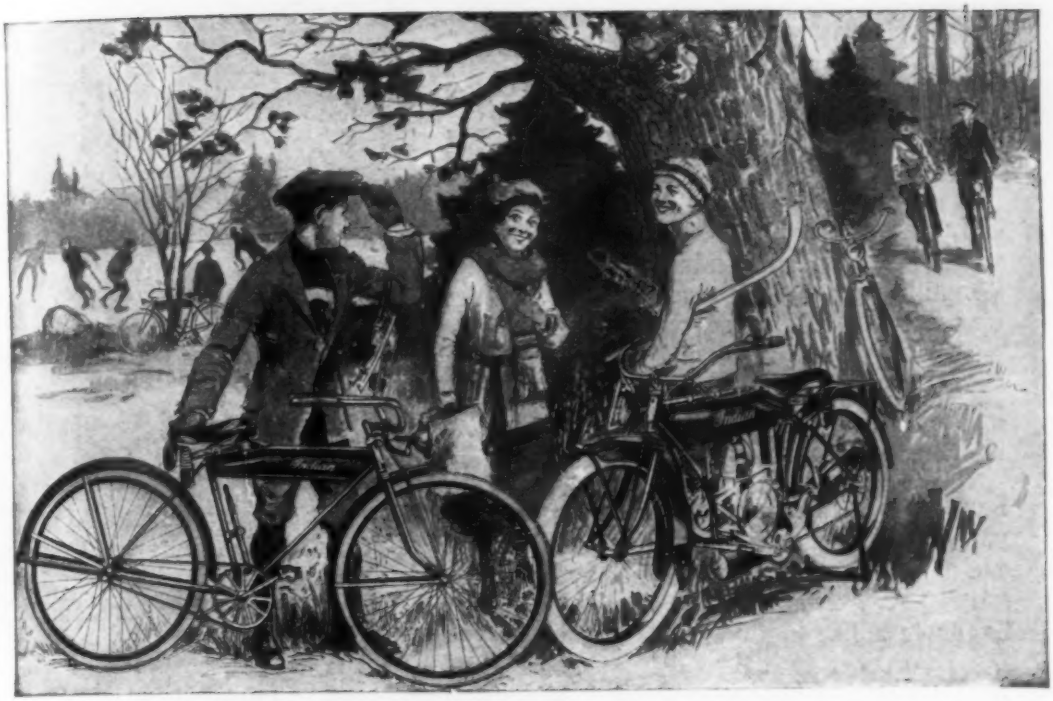
All Druggists—Most Grocers

Malt-Nutrine declared by U. S. Internal Revenue Department to be a pure malt product — not an alcoholic beverage. Contains 14.50 per cent malt solids—1.9 per cent alcohol.

Interesting booklet on request.

ANHEUSER-BUSCH ST. LOUIS, U. S. A.





The BEST Solution of the Youngsters' Christmas Gift Problem

NOT a soon-forgotten toy or worthless trinket, but an economical, practical, body-building, muscle-making 1918 *Electrically Equipped*

Indian Bicycle

Any boy or girl will glory in the possession of this most popular bicycle. Large Electric Light with Reflector, a necessity in those States requiring that bicycles be lighted; Tank Battery Holder, Triple Stem Forks, Indian Crank Hanger, motorcycle style lines throughout. Everything in equipment a bicycle should have.

Eleven other models in the 1918 Indian line, ranging in price from $27.50 to $50. All backed by the Indian nameplate and guarantee.

1918 Indian Light Twin Motocycle—Easily-handled, safe, dependable, mechanically simple motorcycle of modified speed and power. Has all the qualities of Indian super-construction and excellence, plus the Indian's recognized features of operating and upkeep economy. Priced to make it available for anybody who can afford any sort of high-grade two-wheel vehicle.

Give the youngsters what they want—*Indians.* Practical, economical, healthful, they furnish fun and happiness and splendid outdoor exercise the year round.

Send for illustrated Bicycle or Light Twin Catalog, or both

HENDEE MANUFACTURING COMPANY, 711 State Street, Springfield, Mass.
(Largest Manufacturers of Motorcycles in the World)

SUGAR 4c a Lb

Only one of the hundreds of Sensational offers in highest-grade, guaranteed quality, staple groceries in our amazing new Price-Wrecking Catalog. To save all mailing expense and to avoid all waste distribution of this remarkable catalog, we send it ONLY to new customers who send us their order for the SPECIAL "Get Acquainted" assortment listed below. Catalog packed in every shipment.

FLOUR Per bbl. $9.60—SUGAR 100 lbs. $4.00

Stop paying exorbitant prices for groceries. National necessity demands that you buy carefully and waste nothing. Establish yourself with the great Consumers' Wholesale Grocery Co. and cut the high cost of living. Rush your order today. Make your own selections for all future orders—large or small. Sugar 4c a lb.; Flour $9.60 a bbl. with orders. Use the coupon.

Save 1/3 to 1/2

What Our Customers Say

"Goods received, and they are all O. K. Will send another order at once."—Ed. A. Dehme, Prop. The Horicon House, Horicon, Wis.

"Groceries received in good shape and am well pleased with the goods. I consider that I have saved about $4.00. Will order more soon." – J. W. Chester, Kent, Ind.

"I received my order of groceries all right. They are fine—as good as any I have ever used." —R. Donovan, Lyndon, Wis.

We Ship You This $4.21 "Get Acquainted" Order for $2.53 YOU CAN SAVE $1.68

Usual Retail Price		Our Rock-Bottom Price
$0.50	5 lbs. Our Best Granulated Sugar	$0.20
.16	2 Bars American Family Soap	.09
.08	1 Pkg. Gold Dust Washing Powder	.03
.12	1 Large Pkg. Quaker Oats	.06
1.50	3 lbs. Our Special Blend Coffee	.96
.50	1 lb. Special Pure Baking Powder	.40
.40	½ lb. Black Pepper	.20
.40	½ lb. Cinnamon	.20
.55	1 Bottle Pure Vanilla Extract, 4 oz.	.39
$4.21		$2.53

HURRY MAIL THIS TRIAL ORDER COUPON NOW

ORDER BLANK COUPON

CONSUMERS WHOLESALE GROCERY CO.,
1403 to 1409 W. Congress St., Dept. 586
CHICAGO, ILL.

GENTLEMEN—Enclosed please find $2.53, for which please send your Special Bargain Grocery Order and include free your new Price-Wrecking Grocery Catalog. It is understood that if I am not thoroughly pleased with the goods I receive I can return them and you will refund my money.

Name.....

Address.....

City.....State.....

Do not delay. Start today to cut your living expenses. Fill out and mail this coupon with $2.53. Your order will be shipped the same day received. Our money back guarantee is your protection. You take no risk. Send now.

CONSUMERS WHOLESALE GROCERY CO.
1403 to 1409 W. Congress St.
Dept. 586, CHICAGO, ILL.

MONEY-BACK GUARANTEE

We positively guarantee the weight, quality and quantity of every article listed in our catalog. If you are not perfectly satisfied with the goods, return them and we will promptly return every cent of your money.

Mail Coupon for STAG SHARPENER OUTFIT and get TRENCH MIRROR → FREE!

SPECIAL $1 COUPON

Hone, Strop and Trench Mirror Free
THE STAG COMPANY
329 Plymouth Court, Dept. 5244, Chicago

GENTLEMEN: Wishing to take advantage of your 10 days' free trial and money-back guarantee, you may send a Stag Sharpener, hone, strop and Trench Mirror complete. I am sending herewith $1.

Name.....

Address.....

For Trench Mirror alone send only 25c

HONING—STROKE FORWARD

SHARPENS ALL SAFETY RAZOR BLADES

Yes sir, sharpens them sure and fast and better than you ever thought a safety razor blade could be sharpened. No experience necessary—a child can use the Stag Sharpener. Makes old blades like new—makes new blades better. Can't possibly use it wrong—just a few strokes and you have the best shaving edge you ever saw. A head barber's shave all the time with your Safety if you use the Stag Sharpener. The regular price on the Stag Sharpener is $1—it is worth many times that. Here is a special offer for this month—may not be repeated again.

Complete, including unbreakable Trench Mirror, $1 postpaid to you on this special offer

Stag Sharpener $1

with barber's hone and strop and Trench Mirror complete.

TRENCH MIRROR FREE

Handiest, dandiest, finest thing for the soldier boy you ever saw. Trench Mirror positively can't break. Gives a perfect mirrored reflection. Takes practically no room in the soldier's kit. The soldier boys are wild about them. It is absolutely free with the Stag Sharpener outfit. Just mail the coupon above with $1—get Stag Sharpener, hone, strop and Trench Mirror free.

NOTE: If you want the Trench Mirror alone enclose only 25c. It will be sent to you postpaid. **25c**

Order one for every friend you have in the service, either in the army or the navy. They will appreciate it.

Sold on Our Money Back Guarantee Just mail the coupon above, get the Stag Sharpener, test it thoroughly. If it does not do more than we say for it, just send it back and it costs you absolutely nothing, as every Stag outfit is sold positively on

Free Trial We are so sure that the Stag Sharpener must please you that we want you to use it ten days entirely at our risk, and our expense, then if you are not delighted, send it back and get your money back in full. We gladly assume the risk and welcome your order on this liberal Free Trial Money Back Guarantee. Just fill out the coupon above and send on the dollar today.

Ideal Christmas Gift for the Soldier Boy

Uncle Sam says his soldier boys must be clean shaved every day. What better gift than the Stag Sharpener outfit with the Trench Mirror. Remember, the outfit includes a hone and strop, and also the Trench Mirror described above, all packed in attractive kit box. It is a splendid gift for the soldier boy or for any other man. Nothing could be more appreciated. Just fill out the coupon, send the dollar, and if you are not satisfied with the outfit all you have to do is return it and ask for your money back. Don't delay, though, for this offer is extremely special and cannot be held open indefinitely. Be sure to write your name plainly on the coupon.

THE STAG COMPANY
329 Plymouth Ct., Dept. 5244, Chicago

Dealers Dealers the country over tell us the Stag Sharpener outfit is the fastest seller they have. Put in your order now—get the benefit of the great national advertising campaign just starting. Write today for dealer proposition. If you have not seen a Stag outfit yet, mail coupon above.

The Tires on That Christmas Bicycle

are important. You know what the other fellows with bikes say about United States Tires. They're not only the snappiest looking tires made, but, what's a lot more important, they wear longer and better on both city pavement and country roads.

Ten different treads from which to pick the one that you think will best fit your road requirements.

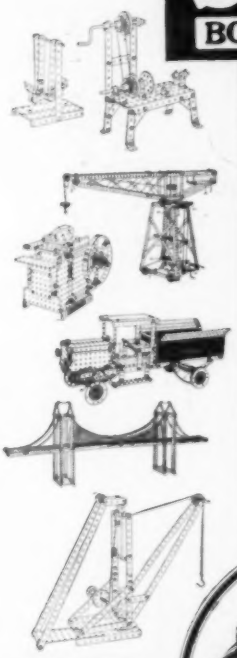
So, when you ask Dad or Mother for a new bike for Christmas, don't forget to tell them you want it equipped with United States Tires.

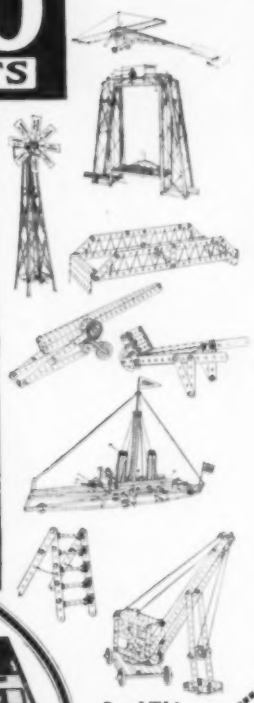
United States Bicycle Tires

Are Good Tires

STRUCTO

BOYS' ENGINEERING OUTFITS





The Greatest Toy Ever Invented for Real Boys

Structo is a miniature of the mechanical world for boys. Structo enables you to make regular working models, engines, battleships, bridges, sky-scrapers, pile drivers, and hundreds of other things—just like famous engineers and inventors make. Then you connect your motor and they work just like the real machines do. The Structo book shows you how to make hundreds of working models. You can design many other models yourself.

POWER ELECTRIC MOTOR

goes free with outfits Nos. 4, 5, 6 and accessory outfit No. 3-A. Equipped with standard shafting, which is interchangeable with Structo gears and pulleys.

STRUCTO GEARS

are wonder gears—deep cut—sure to work.

STRUCTO AUTO BUILDER

A Toy That Includes All the Mechanical Principles of a Real Automobile

Has a triple unit motor, a real steering apparatus—transmission with three speeds—first, second, reverse and brake. Also a differential gear that is a duplicate of the gears used in regular automobiles. You build it yourself into a real working automobile.

STRUCTO Engineering Outfits	
Cadet Outfit..	$ 1.00
No. 1 Outfit..	1.50
No. 2 " ..	2.50
No. 3 " ..	3.75
No. 4 " ..	6.00
No. 5 " ..	12.00
No. 6 " ..	25.00
Junior Engineer...	4.00
Structo Engineer...	6.00
Chief Engineer...	12.00
Multi-Girders, ½ doz..	.60
Multi-Girders, doz...	1.00

Structo Pays the Postage

Structo Manufacturing Company
Freeport, Ill.

Write Us Today for Full Particulars

Send This Coupon TODAY

Structo Mfg. Company
Freeport, Ill.

Please send me free your Structo Auto Builder Book and full information and prices on your Structo Outfits.

Name .....

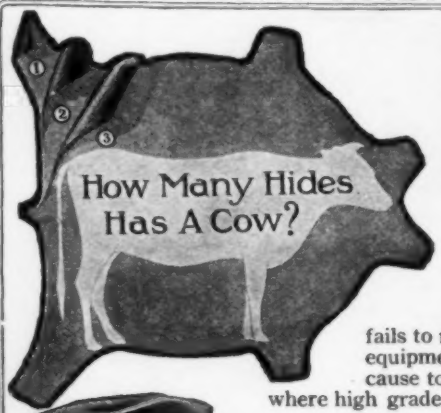
Address .....

City or Town .....

State .....

Father's Name .....

DU PONT AMERICAN INDUSTRIES



Uncle Sam Knows the Real Answer:

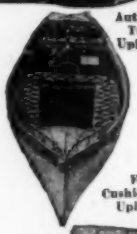
NOT ENOUGH!

SAVE LEATHER

For Soldiers

TO make America's hide supply go as far as possible, hides are being split into five or more thin sheets; but, even this saving scheme fails to meet the requirements for soldiers' shoes, harness, equipment, ship upholstery, factory needs, etc., chiefly because too much hide leather is used by the public in places where high grade leather substitutes will serve as well or better.

For Automobile Tops and Upholstery



For Boat Cushions and Upholstery

For Furniture Upholstery

For Bags, Trunks and Suit Cases

For Book Binding

For Home Decorations, Novelties, Belts, etc.

Uncle Sam Has Set the Pace

The new U. S. motor trucks and ambulances will be upholstered in leather substitutes. For several years the standard for book binding in the Government Printery has been Du Pont Fabrikoid.

The upholstery specifications for the new Merchant Marine call for

DU PONT FABRIKOID
REG. U. S. PAT. OFF.

Craftsman Quality

What Uncle Sam has found by experience and tests good enough for the Government's severe requirements should be good enough for every loyal American.

How You Can Help

If you are a manufacturer using leather probably part or all of your requirements can be met by some grade of Fabrikoid. While not feasible for every use of leather, the illustrations herewith show its wide range of utility.

If you use leather in your home for any purpose, try the proper grade of Fabrikoid instead.

When buying an automobile, boat or piece of furniture prefer Fabrikoid upholstery. Help the manufacturer conserve leather by patronizing those who use good leather substitutes like Fabrikoid.

Every hide displaced by a good substitute helps supply our armies with shoes, our farms with harness and our factories with belting—it helps win the war.

Manufacturers! write us your requirements and let us co-operate with you.

Americans everywhere! write for samples and names of manufacturers, of the article you want, who use Fabrikoid and of stores near you selling it by the yard.

Du Pont Fabrikoid Company, Wilmington, Delaware

World's Largest Manufacturers of Leather Substitutes

Factories at Newburgh, N. Y.: Fairfield, Conn.: Toronto, Ont.

DU PONT

Please Mention Popular Mechanics

Men, Snuggle Up to This Bang-up Underwear—It's a Downright Bargain

You can bet your last cent that Hanes will give you more real value for your money than any other buy. No frills, no fol-de-rols—just downright value and a heaping lot of it, too.

Hanes is form-fitting, elastic and comfortable. The fleecy-warm cotton is mighty fine protection from the cold—and it feels mighty good, too. Pre-shrinking keeps it true to size and shape.

Greatest Winter Underwear **HANES** Sold at Popular Prices

ELASTIC KNIT

UNDERWEAR

And just read about these special features over there in the illustration. No more high-priced underwear for the man who sees Hanes. It's just the popular price for everybody and the underwear everyone should wear.

Mothers, Fathers—Get this Big Bargain

A jam-up boy's union suit, chock-full of all the big features on the men's suits. Downy-soft, warm and everlastingly fine, its value can't be duplicated. You sure ought to buy this splendid underwear for your youngsters. See if it doesn't put it all over anything you ever tried at twice the price!

P. H. HANES KNITTING COMPANY
Winston-Salem, N. C.

Warning to the Trade—Any garment offered as Hanes is a substitute unless it bears the "Hanes" Label.

This Label on Every Garment

HANES

Buy None Without It

The Best Proof of Witte Quality

"I have run gas, gasoline and kerosene engines for several years, but I have never found an engine that equals the WITTE Engine for power, reliability and saving of fuel." —W. W. Demorest, Lamar, Ark.

"I find the engine is complete in every way, very still running and powerful. It is very sensitive to the governor and runs with even motion. If I was to buy another engine it would be a WITTE sure." —H. I. Sporr, Breadloaf, Vt.

"I know it would be a pleasure for Mr. Lackey to recommend the WITTE Engine, as ours is doing such excellent work and giving such splendid service. He had such a time with engines and spent so much on them before he got a WITTE, that it is truly a pleasure to have one so satisfactory."—Mrs. H. R. Lackey, Chautauqua, Kans.

"I have never had a bit of trouble with my WITTE Engine. All I have to do to start it is just turn the wheel and she is off."—W. M. Land, Lardo, Idaho.

"My 4 H. P. WITTE certainly worked fine, doing the work of a 6 H. P. It has as much power as any 6 horse engine I ever saw."—Richard Hoffman, Arlington, Ill.

"If you will allow me to say a few words for your engine; I call it the WITTE Common Sense Engine, for any man with common sense can run one, and it has all the power you claim, and about one-third more."—W. L. Hawk, Barton, Ala.

I Can Make You The Best PRICE

On a Kerosene Engine

Sell You a Better Engine—Save You $15 to $200

Not an experiment! Hundreds in Use! Better and more powerful than ever! Starts as easily as a gasoline engine! Will use any fuel that can be used in a Kerosene engine! You get **three times as much power** for the money at present fuel prices! Your own terms! Cash, Deposit, Payments, or No Money Down! If you are in the market, write me today! I CAN MAKE YOU THE BEST PRICE—Sell You a BETTER Engine—Ship At Once! Any Style—Stationary or Portable.

WITTE ENGINES

Kerosene and Gasoline—2 to 22 H-P.

are made in the largest **exclusive** direct selling engine factory in the world. I make nothing but engines. Over **30 years success** proves quality—**immediate shipment** proves superior factory equipment and business methods—just as my engines are superior. You can see the high quality in every line and curve. Look at the long solid base affording absolutely solid footing. See how cleanly-built—no cumbersome overweight of metal—no cylinder hanging out behind—no interior packing—vertical valves and many other special features that make WITTE Engines high-grade, better, and more desirable. 90-Day Trial will fully convince you of superior quality. Write for latest prices and free book, or come to factory and see them—You are welcome. Ed. H. Witte,

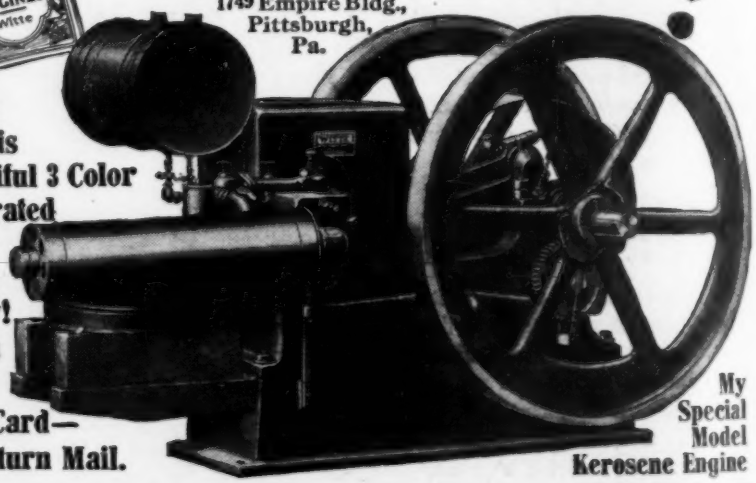
FREE

WITTE ENGINE WORKS

1749 Oakland Ave., Kansas City, Mo.

1749 Empire Bldg., Pittsburgh, Pa.

Write for this Beautiful 3 Color Illustrated FREE BOOK Today! Yours for a Post Card—by Return Mail.



My Special Model Kerosene Engine

OR MAIL THIS SLIP

With Name and Address and I will send postage paid "How to Judge Engines" and "How to Make Money."

No. 1749

NAME.....

TOWN..... *STATE*.....

I Will Save You More Than 1/2 on a $100 UNDERWOOD

E. W. S. SHIPMAN, President

EVERYONE knows the reputation of the Underwood Typewriter. I will send you on TEN DAYS' FREE TRIAL a High Grade No. 4 Visible Writing Underwood, with Back Spacer, Tabulator, Stencil Attachment, Two-color Ribbon, Waterproof Cover and Special Touch Typewriting Instruction Book, that will teach you to operate this simple Underwood in one day. I will give you a **written** guarantee of FIVE YEARS' SERVICE from date of sale and I will save you much more than one-half the manufacturer's price.

25 Years' Experience—Confidence of 200,000 Customers

I am the largest typewriter re-builder in the world, employing the most expert workmen in the typewriter business. I handle only Underwoods, obtaining all my machines and all new parts direct from the Underwood Company.

How I Double the Life of An Underwood

Do not confuse me with a second-hand dealer. I put each machine through a process that I have spent 25 years perfecting. Each machine is taken apart and re-built from top to bottom.

The frame is re-enameled, the bright parts re-nickeled. All parts unfit for further service are discarded and replaced by new parts purchased from the Underwood Company. Every machine is equipped with new type, new platen, new ribbon vibrator, front scale, feed roll, ribbon, space bar, key rings, key glasses, rubber feet, etc. Expert mechanics re-adjust and re-align each machine. It will stand any mechanical typewriter test.

You May RENT APPLYING RENT ON PURCHASE PRICE **OR BUY** FOR CASH OR ON EASY PAYMENTS

My Five Year Guarantee—Ten Days Free Trial

I personally stand back of every machine that goes through my factory with a WRITTEN FIVE YEAR GUARANTEE OF SERVICE. I guarantee to send you a genuine Underwood, exactly as illustrated and described herewith. You don't even have to buy the machine at the time you get it. You can try it for ten days FREE and then, if you conclude the machine I send you does not look, work and write like new, you may return it and I will refund any deposit or charges paid by you. This guarantee affords you complete protection.

Rent or Buy Mail coupon or post card today for special low price and terms. You can RENT, applying six months' rental on purchase price, buy on easy terms or secure discount for cash.

Our Other Plan Brings Underwood FREE

A new plan—our agency plan. You are not asked to do any canvassing or soliciting for orders. You simply co-operate with us, becoming part of our nation-wide organization. You can easily get your Underwood FREE in this way. Send name and address on coupon today and learn about Offer No. 52.

E. W. S. SHIPMAN, President
Typewriter Emporium
CHICAGO

Five Year Guarantee **Ten Days' Free Trial**

SIGN AND MAIL COUPON TODAY

TYPEWRITER EMPORIUM, 34-36 W. Lake Street, CHICAGO

Send me immediately full facts about your Special Offer No. 52.

Name .....

Street or R. R. No. .....

City ..... State .....

Please Mention Popular Mechanics

MAZDA

"Not the name of a thing, but the mark of a service"

No lamps can ever be marked MAZDA unless they embody MAZDA Service standards of excellence

4632

The Meaning of MAZDA

MAZDA is the trademark of a world-wide service to certain lamp manufacturers. Its purpose is to collect and select scientific and practical information concerning progress and developments in the art of incandescent lamp manufacturing and to distribute this information to the companies entitled to receive this Service. MAZDA Service is centered in the Research Laboratories of the General Electric Company at Schenectady, New York.

The mark MAZDA can appear only on lamps which meet the standards of MAZDA Service. It is thus an assurance of quality. This trademark is the property of the General Electric Company.

RESEARCH LABORATORIES OF GENERAL ELECTRIC COMPANY

The curtain call

with all its wit and responsiveness, is no more interesting than the fire-proof curtain itself. This moving fire-wall that protects both audience and stage from panic and disaster is of fabric woven from rock and adorned by the artist's brush—

JOHNS-MANVILLE Asbestos

Resistant to heat, water, wear and weather

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

No magic wand turned it into theatre curtains, table mats, coverings for pipes, linings for furnaces. Only the ceaseless research and labor of a national institution — Johns-Manville—has developed Asbestos. And now Asbestos is a necessity to the large manufacturer and the standby of housewives on ironing day—the roof of huge buildings and the cap for tiny nerves in a sensitive tooth. This is the work of Johns-Manville—hundreds of J-M Products pour into every avenue of life.

H. W. JOHNS-MANVILLE COMPANY
New York City
Branches in 55 Large Cities

Asbestos Fabrics, Packings, Roofings, Shingles, Brake Linings, Building Materials, Electrical Devices, Heat Insulations, Refractory Cements, Waterproofing.

The Motor Car | The Farm | The Home | Industry | Power Plants | Transportation | Roofings

When you think of Asbestos you think of Johns-Manville

Oxy-Acetylene Welding and Cutting

Most Metal Manufacturers Can Save by Welding

One of the oxy-acetylene welding operations employed in metal bed manufacture by The Simmons Company factories at Kenosha, Wisconsin

THE manufacture of metal beds strikingly illustrates the advantages of oxy-acetylene welding—the decided savings of time, labor and materials. Parts formerly riveted required boring, which decreased strength and increased labor costs. By welding, these parts are now fused into one piece of uniform strength. The welding process, as used today, has virtually revolutionized metal bed manufacture.

Stronger, neater products, simplified production, lower costs and *minimized material waste*—these all-important factors are open to every manufacturer of metal products.

Oxy-acetylene welding has proved its value in nearly every line of metal manufacture from the making of delicate jewelry to massive locomotives. It is, in many instances, supplanting the bolt, rivet and threaded joint, when two pieces of metal are to be joined.

Prest-O-Lite PROCESS

Insures better welds, quicker work and lower operating costs. Offers a simple, inexpensive welding outfit for all classes of work. Prest-O-Lite Dissolved Acetylene is furnished in convenient cylinders, making the welding outfit portable for use inside or outside the shop. The Prest-O-Lite System of exchanging empty cylinders for full ones insures universal, perpetual service. Avoids large initial investment and depreciation.

Millions of dollars' worth of valuable castings, machine parts and tools are being reclaimed from the scrap-heap by this process. Railroads, foundries, mines, machine shops and garages—using it exclusively for repair work—are realizing big returns. One quick repair may save the entire cost of a Prest-O-Lite outfit by avoiding a tie-up through the break-down of an important machine. Wherever metal parts are to be joined, welding merits investigation.

Our literature shows hundreds of profitable uses for the Prest-O-Lite Process, in manufacturing, construction and repair work. Write for it.

A Profitable Business for Garages and Repair Shops

The substantial profits to be made on oxy-acetylene welding work present a splendid opportunity to enterprising service garages and repair shops. The demand for welding is large and growing fast. The cost of necessary equipment is low. Send for full details—today.

The Prest-O-Lite Co., Inc.
U. S. Main Offices and Factory
816 SPEEDWAY, INDIANAPOLIS
Canadian General Office
Dept. U TORONTO, ONT.

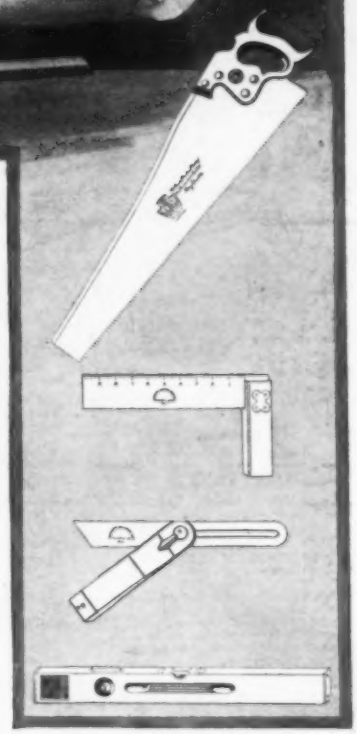
59 Branches and Charging Plants

World's Largest Makers of Dissolved Acetylene

CABINET work calls for clever hands and painstaking craftsmanship. It is poor economy to jeopardize the result by using inferior tools. Most cabinet-makers, whose living depends upon the quality of their work, use Disston saws. They don't guess about their tools—they KNOW.

The name Disston on a mitre-box saw, a web saw, or any other tool means that it was made by experts who know just what qualities such a tool should possess—and how to put those qualities into it. You can saw to the line with Disston saws because they are built right and balanced right. You know how a job is coming out if you begin it with a Disston.

Disston trowels, files, screw-drivers, levels, bevels, gauges, squares, and other tools are all of the same Disston quality.



DISSTON

Send for our free "Hand-Saw Booklet." It tells you how to select, use, and care for saws and other Disston tools.

HENRY DISSTON & SONS, Incorporated
PHILADELPHIA, U. S. A.
Canadian Works: Toronto, Canada

CHICAGO CINCINNATI BOSTON SAN FRANCISCO
MEMPHIS NEW ORLEANS SEATTLE PORTLAND, ORE.
VANCOUVER, B. C. SIDNEY, AUSTRALIA

DISSTON
SAWS AND TOOLS

Please Mention Popular Mechanics

WANTED! WE WANT 300 AGENTS AT $35 TO $70 A WEEK

NEW INVENTION—**just out.** Needed in every home every day. Patent just applied for. Nothing else like it. Supplies what every housewife has wished for for years. Perfected after long experimental work by mechanical experts. Low priced—anyone can use it—**sells on sight.** We want three hundred representatives at once—men or women hustlers—to advertise, accept orders and manage deliveries for our new **Quickedge Knife and Shear Sharpener.** Sharpens any kitchen knife, paring knife, carving knife, bread knife or shears and scissors **in ten seconds.** Agents are taking orders at every house—**wiring for rush shipments.** Write today for this opportunity to make $10 to $20 every day.

MAKE $300 NEXT MONTH

This little machine is a mechanical masterpiece. A child can use it. Just put knife in slot—turn crank—**grinds automatically**—draws blade to keen, sharp, perfect, lasting edge **at absolutely correct bevel for daily use.** Nothing to adjust—nothing to change, nothing to get out of order—**absolutely guaranteed**—will last for years. Once they see it and use it, women will not do without it for several times its cost. One agent wrote: "It was easier for me to learn to sell the **Quickedge** than it was to learn to tear open my pay-envelope in my former dollar-a-day job." Get out of the dollar-a-day class. Get this position, where profits start the first day.

No Experience Required

Just take one of the machines to any house and show it—give a ten-second demonstration upon the dullest knife in the house; **the order is yours right on the spot; instantly.** No talking necessary. No argument. The machine simply sells itself, **and stays sold.** Every customer becomes your friend. They tell others, your profits double and multiply. Leave one hundred on trial over night. Collect the cash for every one of them next day. **The machine will do its own talking;** it is so easy to operate, no explanations or instructions are necessary. Secure your county now; **free.** Get started right now and

Only $1.50 Selling Price

Low price, ease of operation, astonishing quickness and absolute perfection of results, money-back guaranty. These things make the **Quickedge** the fastest seller of the age—**the biggest money-maker for agents, general agents and managers ever invented.**

Make $70 Next Week

Easy to start—easy to make big money if you will just follow instructions and work faithfully. **No charge for territory. 200% profit for agents.** Business supplies capital. Exclusive protection, co-operation and assistance. Failure impossible. Nothing to risk. Success assured.

Easy to demonstrate—and every woman is anxious to see it work—then she would not do without it. No talking necessary. Just show the machine and take the order—**one dollar profit on every call you make.**

Send for application blank and complete information today—**free.** Investigate. **Get the proof.** Don't delay. Write a postal card or letter right now. **Territory is being assigned very fast.** Get your county now—**free.** Write today.

The Quickedge Knife and Shear Sharpener

Grinds any Kitchen Knife or Shears in 10 Seconds

Absolutely Guaranteed

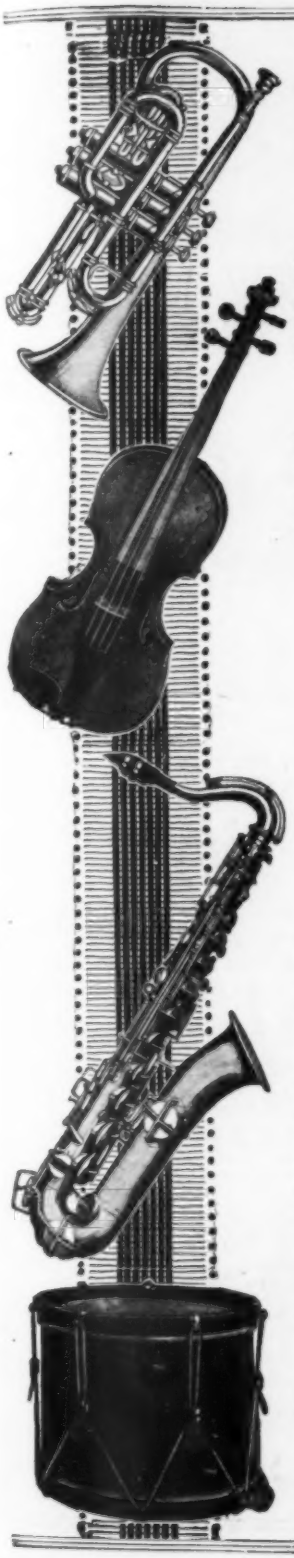
Make as Much Money Next Week as These Men are Making Now

J. C. Lewis, of Kansas, says: **"I have sold one hundred Sharpeners in four days."** Hobart Kerr, of Md., writes: "The women can hardly wait till they get them." Herbert Cain, of Ky., sold nine after supper. At the end of his first day, J. W. Gordon, of Pa., writes: "I sold two dozen, and **I sold to every one I saw."** Wm. G. Hall, of N. J., says: "I think it is great. I sold six in about one-half hour. The machine is a mighty fine proposition. **I am a mechanic and I know what I am talking about."** Peter Courtland, of Mich., writes: "I received your sharpener and opened it in a barber shop. I ground his shears and I got an order for one right on the spot." H. A. Henkel, of Va., says: "I have examined it and find it a wonderful little machine. **The workmanship is simply perfect."** Frank King, Colo., says: "Sample received Saturday. Sold ten today. Sell to most every house." Forest Webb, of Pa., says: "Went out Monday afternoon for about three hours and received one dozen orders. **Profit $12.00."** H. Tillery, of Tenn., wrote: "I took three orders first hour. When you sharpen an old, dull knife, dull as a hoe, in less than a minute, **they sit up and look."** Ray Carter, of Mass., writes: "I went out two days and have orders for thirty sharpeners." **Profit $30.00 for first two days.** John Durr, of Wis., also says: **"I have sold thirty in two days."**

You can make this money. **Send now.** Territory free.

GET BUSY. WRITE TODAY.

The Quickedge Sharpener Company
No. 696 Sharpener Building
215 N. Desplaines St., Chicago, Ill.



10c a Day

You can have your choice of over 2,000 musical instruments for one week's trial in your own home. Then, if you decide to purchase, you can pay the rock-bottom price at the rate of a few cents a day. If you do not want the instrument, send it back. The trial won't cost you a penny.

But first mail the coupon below for our new 194 page catalog illustrating every known musical instrument. You will be astonished at the the low prices and at the liberal offer we are now making.

We Offer—

—the best instruments that can be made.
—rock bottom manufacturer's prices.
—one week's trial at our expense.
—triple silver-plated cornet for only 10c a day.
—your choice of over 2,000 instruments.

WURLITZER

200 years of instrument making

Wurlitzer has supplied the United States Government with Trumpets for 55 years

The name, "*Wurlitzer*", stamped on musical instruments has stood for the highest quality for nearly two centuries. We are manufacturers or importers of every known musical instrument — every one sold to you at direct-from-the-manufacturer price.

Play It a Week—At Our Expense

Try out the instrument of your choice in your own way before you decide to buy. Compare it with other instruments. Test it. Use it just as if it were your own. Then, after one week's trial, either pay a little each month or send it back. The Cornet, Violin, Saxaphone and Snare Drum, illustrated here, are but four of many real *bargains* in instruments which we offer at a few cents a day.

Send the Coupon

Just put your name and address on the coupon now and get our big, new catalog absolutely free. Please state what instrument you are interested in and we will send you the big 176-page book, free and prepaid.

The Rudolph Wurlitzer Co.
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E. 4th Street, Cincinnati, Ohio
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Dept. 1199
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South Wabash Avenue, Chicago, Ill.

Gentlemen: — Please send me your 176-page catalog, absolutely free. Also tell me about your special offer direct from manufacturer.

Name .....

Address .....

I am interested in .....
(Name of instrument here)

Starrett Hack Saws are unexcelled just as *Starrett Tools* are unexcelled

You buy Starrett Tools because you know that you can get none finer, none more accurate, none more dependable.

It's the same with

Starrett Hack-Saws

Whether you buy these saws in large quantities for a big shop, or in smaller numbers for occasional use, you buy more than a good hack saw — you also buy the right saw, the one best fitted for the job.

The right saw cuts quicker, thereby saving valuable time. It lasts longer — doesn't dull as quickly, doesn't break as easily — thereby saving money because fewer are required.

Our Catalog No. 21 AP describes the Hack Saw that is Unexcelled and tells you how to pick the number of saw that will do the best work on any given job.

STARRETT HACK SAWS CUT QUICKER & LAST LONGER

THE L. S. STARRETT COMPANY

The World's Greatest Toolmakers

ATHOL, MASS.

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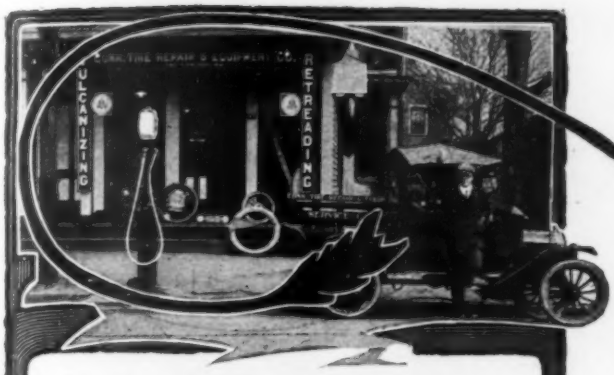

The Haywood Tire Repair Shop of
Paul R. Fredricks
Wallingford, Conn.

Now doing an average business of $450 a week.

YOU TOO CAN MAKE BIG MONEY

We need immediately, more men like Paul R. Fredricks to manage Haywood Tire Repair stations. "Just a year in the business and now doing $400 to $450 a week at a good round profit" tells the story of this ambitious young man's rapid rise to fortune. Scores of men like Fredricks have found their independence in the Tire Repair business, have opened Haywood shops and are making big money. The coupon below or a post card with your name and address will tell you how to start. Send today.

Tire Repairing Revolutionized!!

Motorists To Save Millions in Tire Expense

The Haywood method of tire repairing is different—*Scientific.* It strikes a new chord in tire economy. It is efficient—saves tires—increases mileage—*lasts.* It has required years of experience to develop it. Practical tests have proven it. Its superiority is acknowledged—accepted by those who know, as a *Triumph.*

30 Million Tires to Repair

The demand for tire repairing is now so great that more Haywood stations must be established at once throughout the country. We want capable, energetic, ambitious men in charge of each—men who are dependable—competent. *You can have this opportunity*—share in the Haywood success—become a link in a mammoth chain of a country-wide, thoroughly efficient Tire Repair Service.

Make $3,000 a Year or Better!

You Own Your Own Business! Keep Your Own Profits!

Haywood equipment is sold outright. We teach you Haywood Scientific Tire Repairing in our Laboratory especially equipped for this purpose. Here you learn all about tires—the inner mechanism of construction—how to repair *scientifically* every tire injury. This training is thorough—practical and equips you to give Haywood Service of the standard we advertise nationally and are so careful to maintain—the Service that saves motorists millions of dollars in tire up-keep.

A Wonderful Opportunity

The coupon—your name and address, brings full particulars. How to start. How to tie up with the Haywood Service. We'll give inside facts and figures about costs and profits. Explain in detail our Co-operative Business Building Plans. Write today without fail. Learn how you can start at once.

Haywood Tire & Equipment Co.
658 N. Capitol Ave. Indianapolis, Ind.

Haywood Tire Repair Plants Are Big Money Makers for Ambitious Men. Investigate.

Mail this Today

HAYWOOD TIRE & EQUIPMENT CO.
658 N. Capitol Avenue, Indianapolis, Ind.

Gentlemen:—

Please send full particulars of your Scientific Tire Repair Service and details of your Co-operative Business Building Plans.

Name .....

Address .....

Like Taking an Axe to a Corn

Some methods of removing corns suggest an axe. They are harsh. They attack live tissue as well as the corn. And soreness often follows.

Some are mussy. Some require frequent applications. All were uncertain, all unscientific, until Blue-jay came.

Now, with Blue-jay, you apply a thin protector, which stops the pain at once. In the center—acting on the corn alone—is a gentle, efficient wax. And a tape wraps the toe while it acts.

Blue-jay is applied in a jiffy. When applied, you forget the corn. In two days you find it gone.

About one corn in ten needs a second application. But no corn can resist this new-day method.

At least a million corns a month are ended in this easy, gentle way. Users of Blue-jay apply it as soon as a corn is felt. And it never pains again.

Try it tonight—on any corn, old or new. What it does to that corn, it will do to all. And that means lifetime freedom. You will be amazed to know how easily this trouble can be ended.

Blue-jay Corn Plasters are sold by all Druggists. Also Blue-jay Bunion Plasters.

B&B Blue-jay Corn Plasters
Stop Pain Instantly
End Corns Completely
25c Packages at Druggists

BAUER & BLACK, *Makers of Surgical Dressings, Etc.,* **Chicago and New York**

How Blue-jay Acts

A is a thin, soft pad which stops the pain by relieving the pressure.

B is the B&B wax, which gently undermines the corn. Usually it takes only 48 hours to end the corn completely.

C is rubber adhesive which sticks without wetting. It wraps around the toe, to make the plaster snug and comfortable.

Blue-jay is applied in a jiffy. After that, one doesn't feel the corn. The action is gentle, and applied to the corn alone. So the corn disappears without soreness.

Don't Wear a Truss

Brooks' Appliance, the modern scientific invention, the wonderful new discovery that relieves rupture will be sent on trial. No obnoxious springs or pads.

Brooks' Rupture Appliance

Has automatic Air Cushions. Binds and draws the broken parts together as you would a broken limb. No salves. No lies. Durable, cheap. Sent on trial to prove it. Protected by U. S. patents. Catalogue and measure blanks mailed free. Send name and address today.

C. E. BROOKS, 126A State St., Marshall, Mich.

Deafness Is Misery

I know because I was Deaf and had Head Noises for over 30 years. My invisible Anti-septic Ear Drums restored my hearing and stopped Head Noises, and will do it for you. They are Tiny Megaphones. Cannot be seen when worn. Easy to put in, easy to take out. Are "Unseen Comforts." Inexpensive. Write for Booklet and my **sworn statement** of how I recovered my hearing.

A. O. Leonard, Suite 226, 150 5th Ave., N. Y. City

Send for my book

STRONG ARMS and MILITARY SHOULDERS

for 25c coin or stamps

Illustrated with 20 full-page half-tone cuts, showing exercises that will quickly develop, beautify and gain great strength in your shoulders, arms, and hands, without any apparatus.

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Studio 641, 127 West 42nd Street, New York

Our 21 Jewel SMASHES PRICES

Look!

- 21 Ruby and Sapphire Jewels—
- Adjusted to the second—
- Adjusted to temperature—
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- Adjusted to positions—
- 25-year gold strata case—
- Genuine Montgomery Railroad Dial—
- New Ideas in Thin Cases.

Only $2.50 A Month

And all of this for $2.50—only $2.50 per month—a great reduction in watch prices—direct to you—positively the exact prices the wholesale dealer would have to pay. Think of the high-grade, guaranteed watch we offer here at such a remarkable price. And, if you wish, you may pay this price at the rate of $2.50 a month. Indeed, the days of exhorbitant watch prices have passed.

See It First You don't pay a cent to anybody until you see the watch. You don't buy a Burlington Watch without seeing it. Look at the splendid beauty of the watch itself. Thin model, handsomely shaped—aristocratic in every line. Then look at the works! There you will see the masterpiece of the watch makers' skill. A perfect timepiece adjusted to positions, temperature and isochronism.

Every fighting vessel in the U. S. Navy has the Burlington Watch aboard. Many have over 100 Burlingtons—a few over 200. This includes every torpedo boat—every submarine as well as the big Dreadnaughts.

Send Your Name on This Free Coupon

Get the Burlington Watch Book by sending this coupon now. You will know a lot more about watch buying when you read it. You will be able to "steer clear" of the over-priced watches which are no better. Send the coupon today for the watch book and our offer.

Burlington Watch Co.
19th St. & Marshall Blvd., Dept. 9199 Chicago, Ill.

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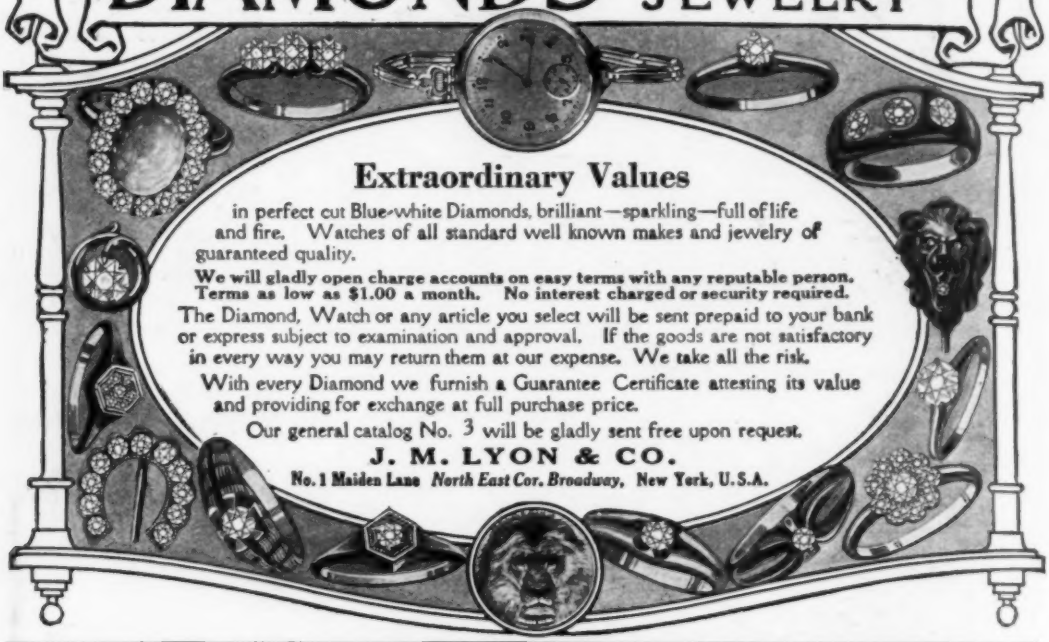
Dept. 9199 Chicago, Ill.

Please send me (without obligation and prepaid) your free book on watches with full explanation of your cash or $2.50 a month offer on the Burlington Watch.

Name_____

Address_____

DIAMONDS WATCHES & JEWELRY



Extraordinary Values

in perfect cut Blue-white Diamonds, brilliant—sparkling—full of life and fire. Watches of all standard well known makes and jewelry of guaranteed quality.

We will gladly open charge accounts on easy terms with any reputable person. Terms as low as $1.00 a month. No interest charged or security required.

The Diamond, Watch or any article you select will be sent prepaid to your bank or express subject to examination and approval. If the goods are not satisfactory in every way you may return them at our expense. We take all the risk.

With every Diamond we furnish a Guarantee Certificate attesting its value and providing for exchange at full purchase price.

Our general catalog No. 3 will be gladly sent free upon request.

J. M. LYON & CO.

No. 1 Maiden Lane *North East Cor. Broadway,* **New York, U.S.A.**

Make Yourself as

Healthy and Attractive

As You'd Like to Be

Enjoy vigorous, **glorious** health. Wonderful new invention—most scientific, successful, **natural** way of acquiring beauty and health. Users astonished at results.

The Violetta

most advanced design of Violet Ray Instruments. Fairly saturates system with beauty and health-giving life. Enriches blood with ozone. Massages tissues with action of Violet Ray. Strengthens entire body. Brings glow of natural lasting, **inimitable** beauty and health. A delight to use. No shocks. Remarkably speedy benefits.

No other method of Beauty or Health Culture Compares with it. Wonderfully effective in treatment of skin affections and scalp diseases. The most successful means of relieving ailments of my nature. **Send now for free booklet** that shows how to make yourself as attractive as you'd like to be.

BLEADON-DUNN CO.

Dept. C, 13 So. Desplaines St., Chicago, Ill.

"I Would Not Part with it for $10,000"

writes an enthusiastic, grateful customer. "Worth more than a farm," says another. So testify over 100,000 **Men** and **Women** who have worn it.

The Natural Body Brace

Develops erect, graceful figure. Brings comfort, health, strength and pep.

Makes You Feel Good and Look Good

Replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens shoulders; relieves backache, curvatures, nervousness, ruptures, etc., in **both sexes.** Fine after operations. Write today for illustrated booklet, measurement blank and our very liberal **free trial** proposition.

HOWARD C. RASH, President

Natural Body Brace Co., 223 Rash Building., Salina, Kans.

Raise Mushrooms

Profits Astonishing

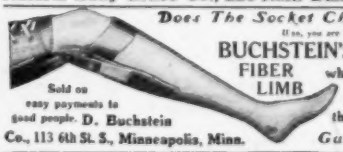
Easy to grow in spare time at home, in cellars, barns, sheds, boxes, etc. I furnish market. Success guaranteed. Free illustrated booklet. Read how a beginner took $131.50 from cellar bed. Write today.

HIRAM BARTON

Desk 2, 329 W. 48th St., New York

Does The Socket Chafe Your Stump?

If so, you are NOT wearing



BUCHSTEIN'S VULCANIZED FIBER LIMB

which is soothing to your stump, cool, neat, light, walls not much thicker than a silver dollar, strong

Sold on easy payments to good people. D. Buchstein Co., 113 6th St. S., Minneapolis, Minn.

Guaranteed 5 Years!

Mammoth Jubilee Book Free

Picturing 5152 Home Things

Make your own Credit Terms—1 to 3 years' time.

SPIEGEL, MAY, STERN CO., 800 W. 35th St., Chicago

GREEN AUTOMATIC MACHINE

Let This Machine Grind Out Money for You

THE GREEN AUTOMATIC MACHINE $10 A DAY AND UP

Sharpens, Hones and Strops all kinds of safety razor blades in one operation, from four to six blades in one minute. For both quality and quantity this machine is in a class by itself. There is nothing like it on the market. Let us send you our free booklet explaining everything, including the "AMERICAN" Key Cutter—cuts square, angular or round slots. Liberal proposition to State Agents.

AMERICAN SHARPENING MACHINE CO. (Inc.), 184 W. Washington St., Dept. 12, CHICAGO

"AMERICAN" Key Cutter

I want, through this advertisement, to establish as friendly business relations with you as I possibly can. I want you to realize also, that it is my earnest effort and intention to give you full honest value for every dollar that you spend with me. This is the only way I can succeed. My advertisement has appeared in this magazine continuously for more than four years.

I am building up my business on the foundation of good value and square dealings. I am saving thousands of satisfied customers thousands of dollars, by supplying, perfect — late style—visible writing—typewriters, at remarkably low prices.

All my transactions are handled throughout by personal correspondence. I assure you every courtesy and consideration, in your dealings with me. Your order will have my prompt, careful, personal attention. I will be glad to do business with you.

Harry A Smith

ALL LATEST IMPROVEMENTS

TYPEWRITER SENSATION

Free TRIAL—Use As You Pay

Send me only $2.50 a month until the low total price of $48.80 is paid, and the machine is yours

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay $2.50 a month and own one. Think of it — Buying a $100.00 machine for $48.80. Cash price, $45.45. Never before has anything like this been attempted.

STANDARD VISIBLE L. C. SMITH

Perfect machines, standard size, keyboard of standard universal arrangement — universally used in teaching the touch system. The entire line of writing completely visible at all times, has the inbuilt tabulator with billing devices, the two color ribbon—with automatic reverse and key controlled shift, automatic flexible paper feed—automatic paper fingers, the back spacer — ball bearing carriage action — ball bearing shift action — ball bearing type bars — in fact, every late style feature and modern operating convenience. Comes to you with everything complete, tools, cover, operating book and instructions, ribbon, practice paper — nothing extra to buy. **You cannot imagine the perfection of this beautiful reconstructed typewriter until you have seen it.** I have sold several thousand of these perfect latest style L. C. Smith machines at this bargain price, and every one of these thousands of satisfied customers had this beautiful, strictly up-to-date machine on five days' free trial before deciding to buy it. I will send it to you F. O. B. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at my expense. You won't want to return it after you try it—**you cannot equal this wonderful value anywhere.**

You Take No Risk—Put In Your Order *Now*

When the typewriter arrives deposit with the express agent $8.80 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw, keep it and send me $2.50 a month until my bargain price of $48.80 is paid. If you don't want it, return it to the express agent, receive your $8.80 and return the machine to me. I will pay the return express charges. **This machine is guaranteed just as if you paid $100.00 for it.** It is standard. Over one hundred thousand people own and use these typewriters and think them the best ever manufactured.

The supply at this price is very limited, the price will probably be raised when my next advertisement appears, so don't delay. Fill in the coupon today—mail to me—the typewriter will be shipped promptly. There is no red tape. I employ no solicitors—no collectors—no chattel mortgage. It is simply understood that I retain title to the machine until the full $48.80 is paid. **You cannot lose. It is the greatest typewriter opportunity you will ever have. Do not send me one cent. Get the coupon in the mails today — sure.**

HARRY A. SMITH, 510-231 N. Fifth Ave., Chicago

H. A. SMITH
Room 510-231 N. Fifth Ave.
CHICAGO, ILL.

Ship me the L. C. Smith F. O. B. Chicago, as described in this advertisement. I will pay you the $40.00 balance of the SPECIAL $48.80 purchase price, at the rate of $2.50 per month. The title to remain in you until fully paid for. It is understood that I have five days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name .....

Address .....

..... Pop. Mech. Dec.

DIAMONDS LOOK

ON EASY PAYMENTS ONLY 2.50 A MONTH

$75 DIAMOND ONLY $50

New Distribution Plan

means a saving of **one-third** of your money. **Write today,** make your Christmas selections *now.*

Here Is the Opportunity of a Lifetime

Startling Offer

—explained when you receive the **New Diamond Book** just off the press. Shows many sizes of diamonds, designs of rings and other beautiful pieces of Diamond jewelry. Any Diamond you want to see will be sent without **one penny down. We trust you absolutely.**

Examine the diamond all you want to. Wear it **30 Days Free.** Send it back at our expense if you do not want it.

Don't Pay Three or Four Dealers' Profits

We sell "Direct" from diamond cutter to you at practically European prices.

Save **one-third** to **one-half** of your money,—and our **Great Distribution Offer** means a still greater saving to you.

WEAR THE DIAMOND

all the time. Right from the time you receive it, and our splendid plan makes you the owner and you scarcely miss the money.

Select your diamond from these shown here if you want to

Write for **Free Diamond Book** today. **See** all the dazzling beauties.

Santa Fe Watch Co.
Dept. D-63 Topeka, Kans.

Simplex Ironer Ends ironing drudgery. Free booklet on request.
AMERICAN IRONING MACHINE CO., Chicago

Deafness

Perfect hearing is now being restored in every condition of deafness or defective hearing from causes such as

Relaxed or Sunken Drums, Roaring or Hissing Sounds, Perforated, Partially Destroyed Drums, etc.

Wilson Common-Sense Ear Drums

"Little Wireless Phones for the Ears"—require no medicine but effectively replace what is lacking or defective in the natural drums. They are simple devices, which the wearer easily fits into the ears where they are invisible. Soft, safe and comfortable to wear at all times.

Write *today* for our 168 page FREE book on DEAFNESS, giving you full particulars and plenty of testimonials.

WILSON EAR DRUM CO., Incorporated
205 Inter-Southern Building LOUISVILLE, KY.

STOP USING A TRUSS

Do Away With Steel And Rubber Bands

FREE TRIAL

Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

FREE to 5,000 Truss Sufferers

To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating rupture. Plapao is a highly astringent medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

Send No Money—for a sufficient quantity of the Plapao is sent without charge to enable you to give it a thorough test; you pay nothing for this trial now or ever. Write for it and full information today. Address
Plapao Laboratories, Block 1427 St. Louis, Mo.

Comfort Indoor Closet

Odorless Sanitary Germ-Proof

Every home without sewerage needs one. Most convenient, meritorious home necessity in a century. A boon to sick people. Can be placed anywhere in the house.

Abolish Outdoor Closet

Put a warm Comfort Toilet in your home, a guarantee of healthy, sanitary conditions. Germ-life killed by chemicals in retort. Emptied once a month—no trouble. Needs no other attention. Boards of Health endorse it. Write now for literature, prices, etc. *Agents wanted—exclusive territory.*

Comfort Chemical Closet Co.
392 Factories Bldg., Toledo, O.

Sent on Free Trial 30 days

NO MORE BALD HEADS

WHEN our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops Dandruff, stops the hair from falling out. Bought by Doctors and men who know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR," sent sealed in plain envelope, FREE.

THE MODERN VACUUM CAP CO.
W. 559 BARCLAY, DENVER, COLO.

Swear Off Tobacco

Tobacco Habit Banished In 48 to 72 Hours

Immediate Results

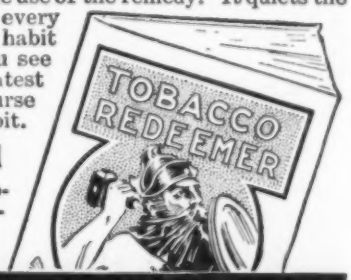
Trying to quit the tobacco habit unaided is a losing fight against heavy odds, and means a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take **Tobacco Redeemer** according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—**Tobacco Redeemer** will positively remove all craving for tobacco in any form in from 48 to 72 hours. Your tobacco craving will begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is the most marvelously quick, absolutely scientific and thoroughly reliable remedy for the tobacco habit.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It quiets the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.



Results Absolutely Guaranteed

A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer** fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You Convincing Proof

If you're a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that **Tobacco Redeemer** will quickly free you from the habit.

Newell Pharmacal Company
Dept. 300 **St. Louis, Mo.**

Free Book Coupon

NEWELL PHARMACAL CO.,
Dept. 300 **St. Louis, Mo.**

Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit.

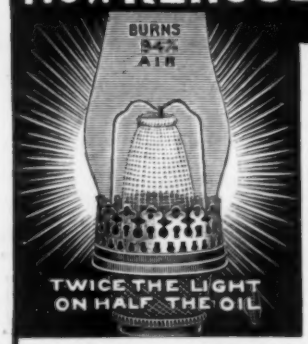
Name.....

Street and No.....

Town..... State.....

New KEROSENE LIGHT BEATS ELECTRIC OR GASOLINE

10 Days FREE—Send No Money



Get One FREE

We don't ask you to pay us a cent until you have used this wonderful modern white light in your own home ten days, then you may return it at our expense if not perfectly satisfied. We want to prove to you that it makes an ordinary oil lamp look like a candle; beats electric, gasoline or acetylene. Passed by Insurance Underwriters. Children handle easily. Tests by U. S. Government and 35 leading Universities show that the new **ALADDIN**

Burns 50 Hours on One Gallon

common kerosene (coal oil), no odor, smoke or noise, simple, clean, won't explode. Over three million people already enjoying this powerful, white, steady light, nearest to sunlight. **Won Gold Medal** at Panama Exposition. Greatest invention of the age. Guaranteed.

$1000 Reward will be given to the person who shows us an oil lamp equal to the new **Aladdin** in every way (details of offer given in our circular). We want **one user in each locality** to whom we can refer customers. To that person we have a special introductory offer to make, under which one lamp is **given free.** Write quick for our 10-Day Free Trial Offer and learn how to get **one free,** all charges prepaid. **Yours FREE** **Yours FREE**

MANTLE LAMP CO., 312 Aladdin Building, CHICAGO, ILL.
Largest Kerosene (Coal Oil) Mantle Lamp House in the World

Men With Rigs or Autos Make

$100 to $300 Per Month

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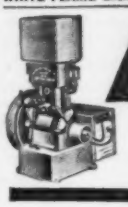

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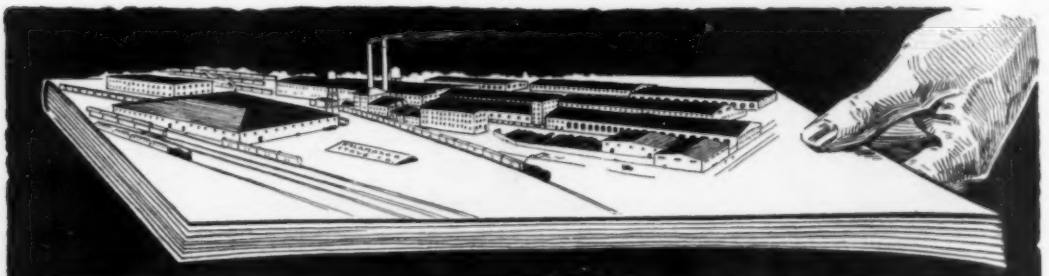

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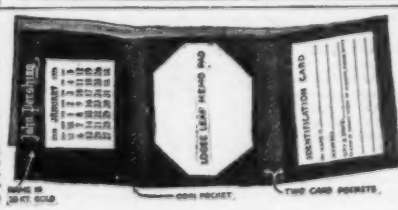

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(Exclusive Controllers of the Genuine Mexican Diamond)

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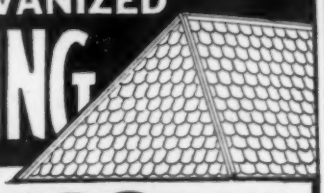

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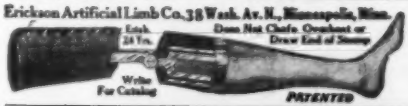

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The Akron Truss Co. Gentlemen: I am 86 years and 6 months old and have had a rupture for 27 years. I am an active man, tend to a large garden, saw and split the wood and do the household chores. I bought an Akron Truss and wore it one year and am as sound as a dollar.
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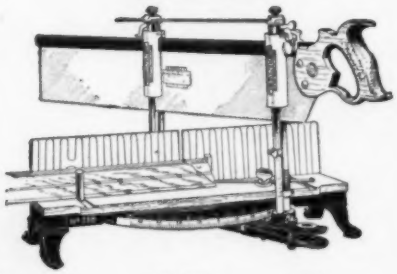

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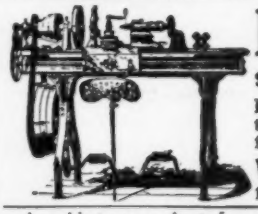

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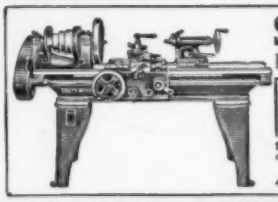

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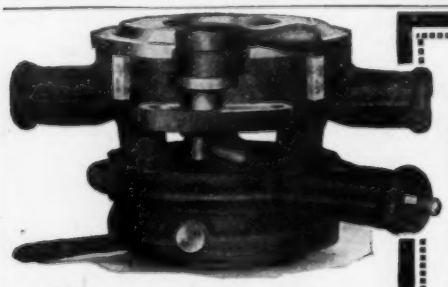

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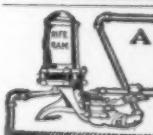

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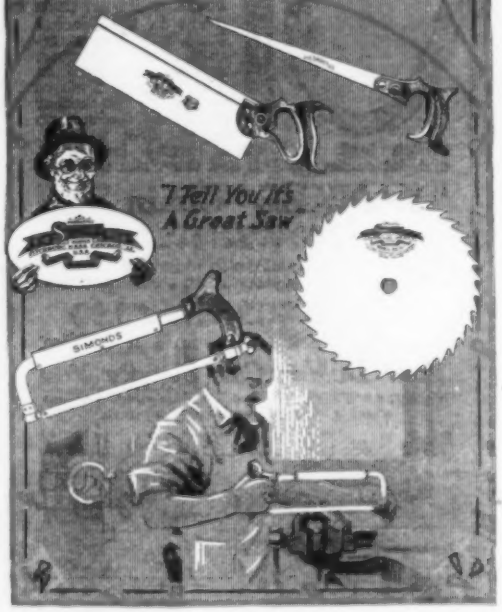

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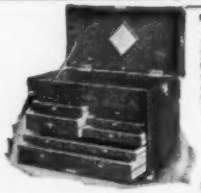

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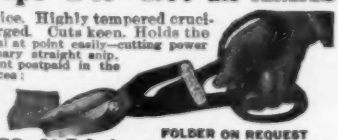
FOR HIS CHRISTMAS—$1.30

will purchase one of our patented **Compound Lever VEST POCKET SNIPS.** They are 7 inches long and stamped from the same grade of crucible tool steel that our larger shears are made from. Guaranteed to cut 24 gauge metal. Highly polished and packed in individual boxes. Sent postpaid in U. S. or Canada upon receipt of price. If desired we can furnish in nickel-plated finish for 50 cents additional.

DROP-FORGED Compound Lever Snips $2 to $4.60 FOR HIS XMAS

Made for hardest service. Highly tempered crucible tool steel, drop forged. Cuts keen. Holds the edge. Cuts 18-gauge metal at point easily—cutting power three times that of ordinary straight snip.
For sale by dealers or sent postpaid in the United States at these prices:

8-inch	$2.00
10-inch	3.00
12-inch	4.00
14-inch	4.60



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Directed Toward Greater Accuracy & Greater Efficiency

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Every Builder and Contractor Needs this Level

10 Days' Free Trial

We have been makers of transits and levels since 1863 and our instruments are the standard of the world. Prove the superior quality of the Aloe Convertible Level by giving it a 10 days free trial. Use it on your every-day work laying out buildings, leveling up foundations, walls and floors, aligning, shafting walls, piers, etc., for getting angles or levels anywhere.

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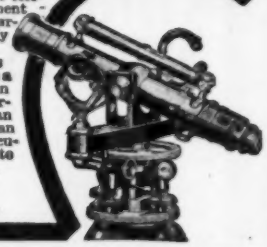
If you decide to keep it, the instrument will earn its way while you make monthly payments so small that you hardly feel them. Costs no more than to pay all cash. No red tape about it, no embarrassing questions, everything confidential.

Aloe Convertible Level

is the finest instrument ever offered at anywhere near its price. Permits taking of sights both above and below the horizontal. For taking vertical sights it is provided with a special convertible bracket rigidly and permanently attached to the cross bar. The telescope is fitted with permanent axis which rests in bracket bearings and is held by clasps easily and quickly released.

Aside from being a level, it is a modified transit that permits a much wider range of work than is possible with the ordinary architect's level. With it the man without technical training can obtain the same absolutely accurate results as the expert. Write today for descriptive circular.



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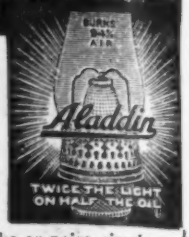
Beats Electric or Gasoline



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Burns 50 Hours on One Gallon

common kerosene. No odor, smoke or noise, simple, no pumping up, no pressure, won't explode. Tests by U. S. Government and thirty-five leading universities show the Aladdin gives **three times as much light** as best round wick flame lamps. **Won Gold Medal** at Panama Exposition. Over three million people already enjoying this powerful, white, steady light, nearest to sunlight. Guaranteed. And think of it—you can get it **without paying out a cent.** All charges prepaid. Ask for our 10-day Free Trial Offer and learn how to get **one Free.**

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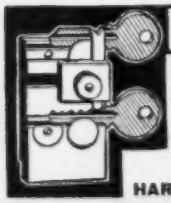

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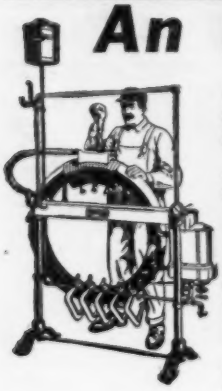

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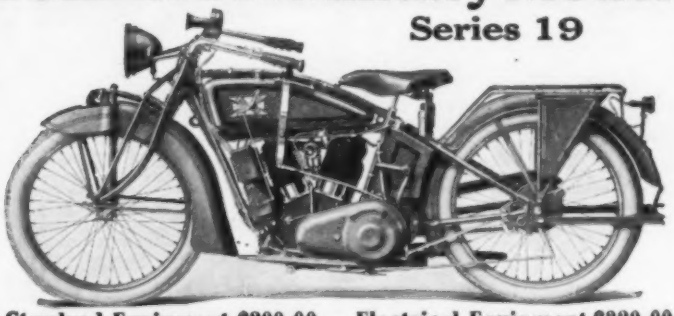
The Master Motorcycle

Series 19



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Supreme in speed,
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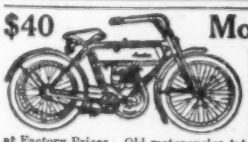

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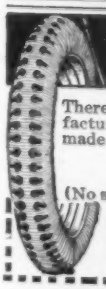

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LASTS A LIFE TIME

PAYS FOR ITSELF FIRST MONTH

No Soiled Hands

No Bending

Holds Any Size Shoe

Sent prepaid for $1.50

In Canada the price is $2

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Open, it's a strong, serviceable, practical, economical, light truck. **Closed,** it's an attractive roadster. No tools needed to change. Nicely finished in black enamel. Lettering does not show when folded. Easily attached. Low in price. For Ford or Chevrolet. Write for free circular giving full description. Also shows other style bodies.

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60 SECONDS MAKES THIS CHANGE—

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Direct at Factory Prices

This $2 KNIFE 88c Postpaid
Hand Forged Razor Steel Blades

Handy shaped blade makes this knife best for mechanics, sportsmen and farmers; light but strong; resharpened easily. Stag handle. German silver finish; blades file tested, hand forged from razor steel and warranted.

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The slightest cut, received while working with tools, may become infected.

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The Safe Antiseptic

should always be at hand, so it may be applied promptly to cuts and small wounds to prevent infection.

Infantile Paralysis

left 8-year-old Evlyn Olson so crippled she had to crawl on her knees. Five months' treatment at the McLain Sanitarium restored her feet and limbs to the satisfactory condition shown in the lower picture. Her mother has this to say:

We feel it our duty to recommend your sanitarium. Evlyn was stricken with Infantile Paralysis in August 1915. March 1, 1916, we carried her to you. Five months later she could walk without crutches or braces. Words cannot express our thanks.

MR. and MRS. JOHN OLSON,
R. D. 7, Grinnell, Iowa

For Crippled Children

The McLain Sanitarium is a thoroughly equipped private Institution devoted exclusively to the treatment of Club Feet, Infantile Paralysis, Spinal Diseases and Deformities, Hip Disease, Wry Neck, etc., especially as found in children and young adults. Our book, "Deformities and Paralysis;" also "Book of References," free on request.

The McLain Orthopedic Sanitarium
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is what you get in Watkins Class "B" all iron motors. Especially fine for canoes and light boats. Constant and efficient.

3 H. P. single cylinder . . . 45 lbs.
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Are light, at the same time strong, accomplished by using semi-steel castings, high carbon steel shaft, bronze bearings, high class workmanship.

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—the **one** standard railroad watch "That's Guaranteed for Life," thin model, all sizes, **adjusted** to positions, **adjusted** to isochronism, **adjusted** to temperature, **adjusted** to the second.

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A keen eye, steady aim and gun with quick action, score "dead."

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The Real Sportsmen's Oil

in the patented can with the disappearing spout—the slickest oil in the world for gun actions, reels, tackle, traps, typewriters, phonographs and all household uses.

Lubricates, polishes, prevents rust.

If your dealer hasn't Homol yet, send us his name and a quarter and we'll send you a 5-ounce can, carriage prepaid.

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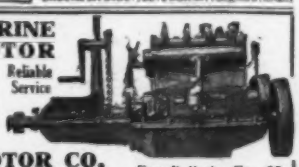

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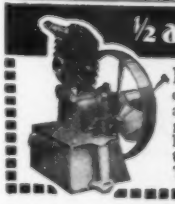

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Everywhere, in all parts of the country, on all kinds of work you'll find Galloway Engines on the job delivering 100% service. I make all kinds—from the small 1¾ horse-power—to the big, powerful horse drawn—16 horse-power. For every kind of a power work there is a Galloway Engine just built to do it.

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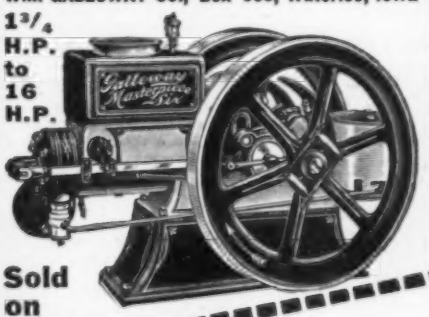

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Get an Ives Train and track. Ask your folks for one for Christmas. Passenger cars, freight cars, coal cars, cabooses — just like real. Electric and mechanical locomotives — bridges and signals, etc.

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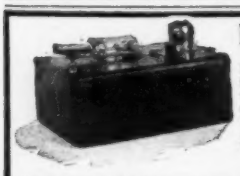
A really gorgeous book, with big pictures of trains in real colors and colored designs used on the cars. Tells about electricity and history of Ives Toys. Send five 2 cent stamps for it to pay postage, packing, etc.



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Pat. Sept. 4, '17

For individual instruction and practice in sending or receiving messages by means of sound (Radio) or light (Blinker) signals. Officially adopted by U. S. Navy, Massachusetts Institute of Technology and Boy Scouts of America. Used by U. S. Army and U. S. Marine Corps.

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This instrument is offered at an extremely low price. It is excellent for building your own amplifier. Can also be used in many experiments where a sensitive microphone is required.

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This detecting instrument of marvelous sensitivity can be used for detecting secret conversations. Outfit consists of Sensitive Transmitter, 25-ft. Black Cord, Receiver, Headband, Case and Battery.

Send for One Today and Convince Yourself.

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is a super-sensitive instrument which has been developed to meet the demands for a practical and efficient hearing device at an extremely low price. It is equal to any $35 instrument made and superior to most of them. The outfit consists of One Super-Sensitive Transmitter with cord connector; One Super-Sensitive Ear Piece with small black cord; One Black Single Headband; Black Case and Two Batteries. Write today for free booklet.

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An ideal Christmas gift for a **live** boy. Runs a dozen toys at once. Connects direct to light circuit, doing away with heavy, expensive batteries. Large capacity—11 different voltages; absolutely safe. Economical. Lasts forever. **PRICE, $3.00.**

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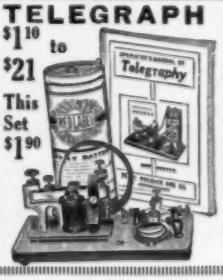
TELEGRAPH INSTRUMENTS

$1.10 to $21

This Set $1.90



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This New Thin Model 17 Jewel Elgin is absolutely supreme where Reliability is a factor. Double sunk dial—Double Roller Escapement—Double strata 25 year Gold case. It's just the watch you've always wanted.

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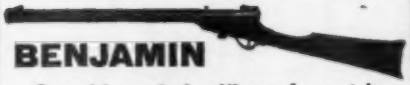

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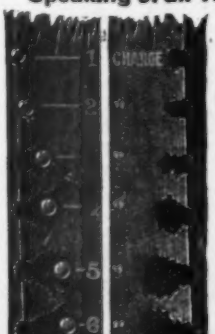

Only real pump gun ever invented. Unlike all others, it never loses shooting force.

Man and boys gun for target practice and small game hunting.

This perforated inch block of wood shows the various degrees of shooting force. This is a feat no other air rifle can duplicate.

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Power for YOU!

Power from within! Strength that is ***more*** than mere muscular strength — the strength of better health, abundant nerve force—the strength of the perfect man. Don't you want it? Nine people out of every ten are only ***half alive!*** How about yourself.

All the Exhilarating Joys of Life Strength Youth

Do you feel just right? If you do not—if you haven't that vigorous "go ahead" feeling all the time—don't fail to send the coupon for full particulars about the White Cross Electric Vibrator. In vibration there exists many of the secrets of life. You now have an opportunity of seeing what vibration will do for you—how every nerve, every fibre in your whole body will fairly tingle. Try this remarkable instrument for yourself—test it. Now is the time for YOU to send for the free book, **"Health and Beauty."** Thousands have received it. You are invited to write for it, too.

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The White Cross Electric Vibrator is the result of years of work and experiment. If you have your house wired for electricity, you connect it up as easily as an electric lamp; if not, we can supply you with models operated on their own batteries.

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For a short time only we are making a remarkable Special Introductory Offer on the White Cross Electric Vibrator, in order to place at least one of these splendid instruments in every city, town, village in the country.

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Lionel Trains are patterned after the big electric trains. They have fine, high-power, electric motors and are full of dash and go! Built with the weight close to the track; handsomely enameled — unbreakable — good for years of fun. Operate economically on batteries, or on house current with Lionel Transformer.

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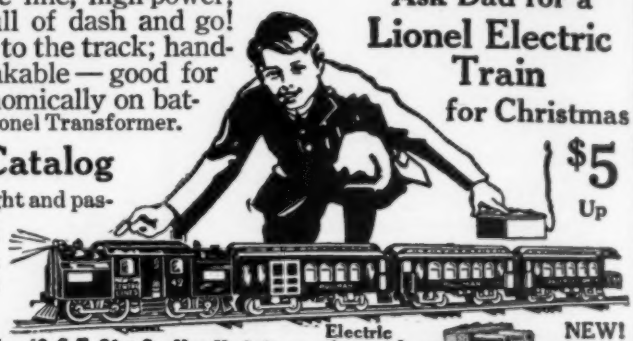
— showing complete line of freight and passenger sets. Over 100 fascinating pictures. Tell Dad or Mother what you want and if not at your dealer's, I'll ship prepaid on receipt of price.

Ask Dad for a Lionel Electric Train for Christmas

$5 Up



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NEW!

Electric Armored Car $5

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Runs All Kinds Of Electric Trains And Toys

ATTACHES to your house current, operates all electric toys and other small electrical apparatus; any gradation of power from 2 to 30 volts. This special $3.40 transformer is Lionel quality, high grade, all thru. Absolutely safe. If not at your dealer's order direct giving us his name. We will ship, charges prepaid. Other models up to $8.00; send for catalogue.

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Because the Maxim Silencer absorbs 75% of the recoil. Increase the pleasure of home practice or hunting trip with a

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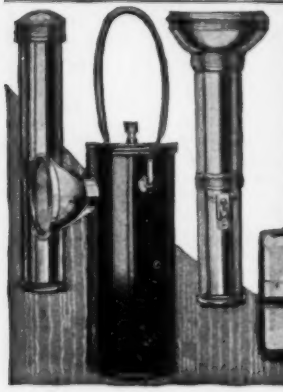

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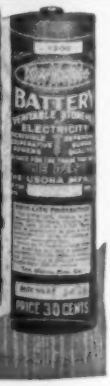
Always look to Kwiklite for improvements in flashlights. For instance, the new Seamless Battery (no soldering whatever), which is guaranteed for 25% longer burning life. Then there is the original "Telescopic Construction" which strengthens the case and permits easy withdrawal of the battery for inspection or renewal. The Self Locking Switch allows continuous or intermittent light as desired. The Improved Reflector gives clearest light, free from rings or blotches.

Sold by Hardware, Drug, Electrical and Sporting Goods Dealers. Send today for Booklet 41 which tells all about the 88 different models including several new ones just out.

The Usona Manufacturing Company New York, Toledo San Francisco

Renew any Flashlight with KWIK-LITE Seamless Batteries— 25% longer service guaranteed.



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I Am "Big Dick"

American Boys Attention!

I never miss fire.

I shoot thirty-six (36) wooden bullets as fast as you can turn the firing-crank. I shoot true as your aim and my strong iron base keeps me from "jumping."

For indoor war play I have no equal and will give you and your friends exciting fun storming the German Breast-works you can easily build.

If you are a real live American Boy you will want me.

Tell mother and father I am not dangerous and just whisper to them that Christmas is coming.

You will find me at most toy dealers and well worth the $3.00 asked. If you don't find me at your dealers send the price to my builders and they will send me direct to your home.

Don't forget!

"BIG DICK"

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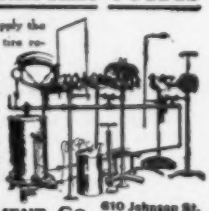
Start a Big-Paying Business of your own with a BADGER TIRE REPAIR OUTFIT

THE man who's equipped to supply the stupendous demand for auto tire repairs can make an assured income of $200 to $300 or more per month. The famous **Badger** Solid Pad System with its strong array of improved features insures your customers quick, economical, high-grade repair jobs, **the kind that build up steady trade.** We teach you free. Write for Catalog and details.



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$500 REWARD

We will pay $500.00 reward to anyone who can permanently dim the brilliancy of the RAJAH Im. diamond without destroying the stone.

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They stand all diamond tests—fire, acid, file, and glass cutting. Their brilliancy is eternal. Guaranteed for a lifetime. Set in solid gold, and sent to you on **30 Days' Free Trial** If you can tell it from a real diamond return it. Send today for our beautiful FREE illustrated jewelry catalog in colors. Write now.

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There are thousands of miles of railroads that must be equipped with block signal systems. Many states already passed laws that require automatic block signals on all railroads. To superintend these installations and maintain the systems now in use, thousands of men are necessary. Golden opportunities are offered. The work is big and broad—high salaries are paid—$250.00 a month is an ordinary salary for a Signal Engineer.

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Put your name and address in the coupon, in a letter or on a post card now and get the free book about Signal Engineering. It will be sent to you prepaid—without obligation. Every ambitious man in America should get this book on Signal Engineering. Find out about the opportunities that are offered you. You are under no obligations in sending this coupon—so write at once—today.

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Gentlemen:—Please send me, absolutely free and prepaid, your big new book on Signal Engineering. Also full particulars about your great special free outfit offer. It is distinctly understood that I assume no obligation of any kind.

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Inventors Badly Needed Now

Big Demand for Almost Any Invention

The "Man with an Idea" Is Important Personage Today. Must Solve Both War and Domestic Problems

NEVER before has the demand for something—almost anything—in the way of a new invention been as great as it is today. In the past, many of our small manufactured articles came from abroad—most of them from Germany—and this supply is of course completely cut off. American manufacturers must supply these things now, and many others besides. Naturally, in meeting competition they want something a little better than the public has been getting and something that they alone can manufacture. This is where the demand for newly patented articles comes in—and it spells Opportunity for the inventor. Now is the time for the "Man with an Idea" to come forward and "cash in" on his brains.

"The demand for patented inventions, today, seems to be almost unlimited," said a Washington patent attorney in an interview recently. "Our firm is flooded with inquiries for good articles in all lines.

Reason for Demand

"I attribute the demand to the fact that farsighted manufacturers who are now making war supplies want to be ready to jump in with something else as soon as war stops, and of course they are making their plans now. If the inventor sells his patent, it makes no difference to him, of course, when the articles are made—and it is the man who has something good to offer right now who is going to 'get in on the ground floor.'

"But there are other reasons for the present demand. Our supplies from abroad have stopped, and American manufacturers have got to get busy. They don't want to imitate the old foreign articles—especially the German ones; they want something new and American to make—something better than we have been getting from Europe. And our American inventors can give it to them!

Patents Actually Asked For

"Then there is the importance of time and labor saving inventions—often only slight improvements in old machines but in these days of high wages and high costs, the inventor who makes a machine to save a few moments or a little material is an important man.

"Here are a few of the requests we have had: One man wants anything good to handle through agents, but especially something in milking machines. Another wants good things in household specialties. Another is interested in an improved tooth brush, tire pump or speedometer. Another wants a machine that can be used by the purchaser to base a business on—something like the Crispette Machine, the Photo-button Camera, a new vulcanizing plant, etc. Another wants a tooth brush, mail box, spark plug, folding crate, cigar lighter, pipe threader and general kitchen articles. Another asks for patents on toys; another wants counting and measuring devices; another wants automobile specialties—and so on and on, through almost everything that Americans may have invented, or might invent with a little thought.

How to Find Out What is Needed

"The trouble with inventors is that they are usually careless of their own interests. They invent something, but they put off patenting it, and the first thing they know someone else has gotten ahead of them. I know a man who thought of the tire chain for autos five years before they were made, but he didn't have enough energy to protect his idea and lost out. The company manufacturing them has made millions.

"Anyone of an inventive turn who is in earnest and who wants to find out what is needed, need only write to our firm and we will send him a list of things for which we have received from one to twenty-five requests. We mail this free, and we send him, too, our book, 'How to Obtain a Patent,' which will give him full information. If he has an invention, and will send us a sketch or model and a description of it, we will tell him without charge, whether it is proper subject matter for a patent, and if he applies for a patent through us, we put him in touch with manufacturers who want patents. We also **advertise his patent for sale** without charge to him.

"Our business is to get patents for our clients but it is also our business to help our clients to make money from their inventions and this is what we are trying to do. Our firm name is Chandlee & Chandlee and our address is 537 Seventh Street, Washington, D. C."

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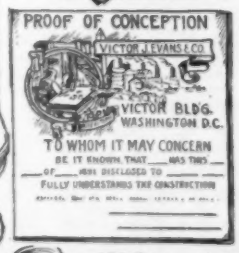

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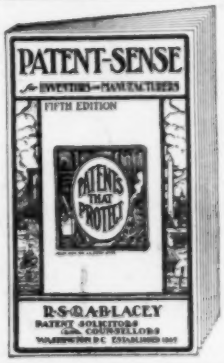

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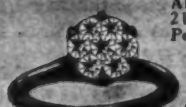

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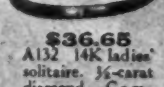

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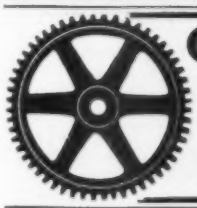

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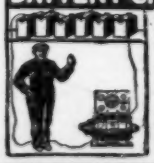

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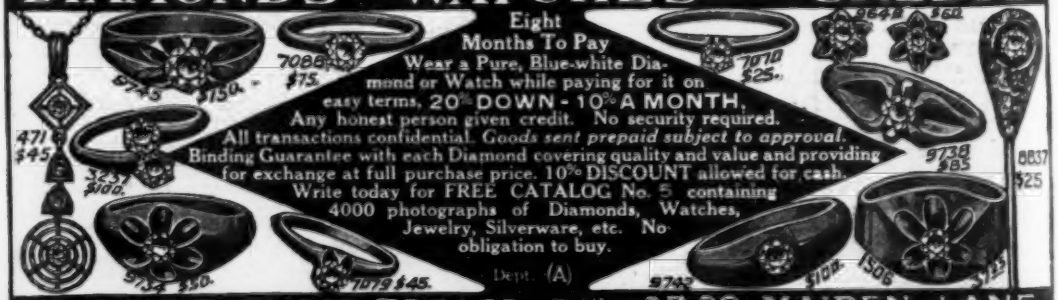

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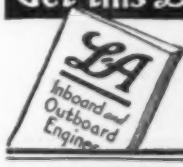

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Persons having neglected their Musical Education need not despair, for with the aid of our new VAMPING CARD (placing the card upright over the piano keys), you can at once Vamp away to thousands of Songs, Ballads, Waltzes, Rag Time, etc., etc., equal to a Professional Musician. No knowledge of music is required. After using it a few times, you will be able to dispense with the aid of the Vamping Card entirely. The price of this very clever invention is **only 18 cts. postpaid.**

JOHNSON SMITH & CO., Dept. 93, 54 W. Lake Street, CHICAGO

Living in ignorance. Learn at once about nature's new phase of energy, so beneficial to all forms of life. You owe it to yourself to learn more about those sources of nature whence all truth springs. Read about atomized radiant electricity in the form of violet rays—health-giving and health restoring. Violet-Ray energy is the closest approach to artificial vital force so far produced by science. Learn how to relieve suffering, how to increase your physical strength, improve your circulation and general well-being and how to assist nature in her own way to give you the healthy bloom of a natural complexion and splendid bearing of a perfect physique.

VI-RAY-O

is the name of the famous Home Violet Ray Instrument. A scientific little apparatus, simple and safe to operate from any lamp socket or from dry batteries. It has now been used for four years with the greatest success by the medical profession. Medical authorities endorse it and 40,000 satisfied users recommend it. Vi-ray-o is not a vibrator. It benefits by painless electricity. It instantly relieves pain and aches, rheumatism, lumbago, headaches, asthma, nervous troubles, reduces swellings and relieves chronic ailments in most instances. It ozonizes the blood by carrying oxygen into the tissues. It is excellent for skin and scalp diseases, restores hair to natural color and removes facial blemishes. Go to your electrical store and ask for a demonstration or send today for the **Free Book** and our 30 days' free trial offer. Fill in the coupon and mail it to us.

Western Coil & Electrical Co.
Box 29, Racine, Wis.

SEND FOR THIS FREE BOOK NOW

WESTERN COIL & ELECTRICAL CO., Box 29, RACINE, WIS.

Please send me your book on health, beauty and strength. Also details of your 30 day trial offer.

Name.....

Street.....

Town..... *State*.....

A REAL X'MAS GIFT

AUTO-WHEEL
CONVERTIBLE ROADSTER

There's nothing a real boy likes better than a real Coaster Wagon

HIS COASTER is his side partner almost everywhere he goes, in almost everything he does. His play centers around it. His work is often made more pleasant because of it.

The Auto-Wheel Convertible Roadster is the very latest thing in wagons. Every boy who sees the Auto-Wheel wants one because of its two-in-one construction.

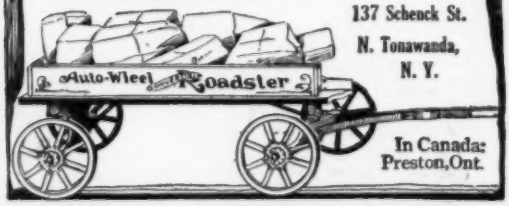
It's both a roadster and a coaster. To change from one to the other means simply pulling up the sides or turning them back.

Get your boy an Auto-Wheel Convertible. Made with ball-bearing wheels, dust-proof hub caps, steel axles—just like the famous Auto-Wheel Coaster. Don't take a substitute.

BOYS! Get a FELT PENNANT, FREE. Send us names of three Coaster Wagon Dealers and we'll mail you the Pennant. Ask Dad or Mother to get you an Auto-Wheel Convertible FOR CHRISTMAS.

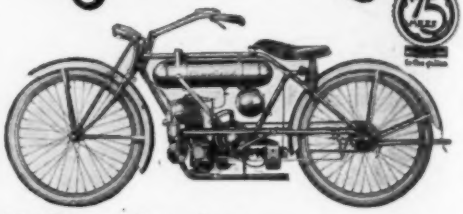
BUFFALO SLED COMPANY

137 Schenck St.
N. Tonawanda,
N. Y.



In Canada:
Preston, Ont.

The Cleveland Lightweight



It Dominates—

Where elegance and refinement are essential, the Cleveland Lightweight is in marked evidence.

In its ultra-distinctiveness, it enjoys that reputation which places it wholly apart from the ordinary.

Cleveland Dealers are making money

We will gladly talk the Agency proposition with you.

$175 F.O.B. Cleveland, O., U.S.A.

Cleveland Motorcycle Manufacturing Co.
7209 Platt Avenue, Cleveland, Ohio

FREE STEEL SHOE BOOK SAVES $20

Tells all about my Celebrated Steel Shoes. One of the greatest inventions in footwear the world has ever known. Over a million people now wearing them. Wear as long as three to six pairs of leather shoes. Easiest, most comfortable shoes you ever had on your feet. No cold, wet feet, therefore Colds, Rheumatism, Grip, Lumbago, Lame Back, and other ailments prevented. No corns, bunions or tender, tired feet. Write today for my free book.

Investigate this wonderful proposition.

Address: **RUTHSTEIN, Steel Shoe Man, Dept. 32, RACINE, WIS.**

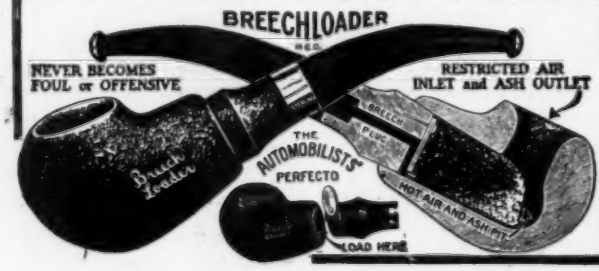
WEBER Throttle-Governed VALVE-IN-HEAD KEROSENE ENGINES

WILL SAVE YOU HALF IN FUEL COST. All 1917 Weber Engines are equipped with that great engine improvement, the "Weberator." Makes Kerosene as convenient to use as Gasoline. Saves ½ the cost. Write today for full details and 60 day trial offer. Sold direct to user at factory prices.

WEBER ENGINE CO.,
Dept. 1779 KANSAS CITY, MO.

WE ARE READY TO PROVE The SUPERIORITY Of Our Over All Other PEACE Producers BREECHLOADER

Our Claim That It IS The FIRST and ONLY Positively DRY "JUICELESS", "HEELLESS", "CLOGLESS", SWEET, SANITARY, OPEN SAFETY Smoking Pipe Ever Devised IS Backed By Our BONA FIDE GUARANTEE To Make Good Or REFUND The Purchasers' Money UPON DEMAND. Such A Proposition Precludes Further Parley. The Practical Man Cannot Fail To See Genuineness And Feasibility In This NEW SIMPLE Method. HOW DOES IT LOOK To YOU? Surely GOOD ENOUGH To Try With All CHANCE ELIMINATED.



THE BREECHLOADER

Is EXTREMELY SIMPLE, Most Substantial and Practical; Neat and Unique in Design; A Very Desirable Size; 5¼ in. long With Graceful Curves; A Little on the "Chubby" order, Half Bent; Considerably Lighter, Holding about one-fourth more Tobacco than the ordinary pipe of the same size. The bowl and Breech Plug are made of **FIRST QUALITY, GENUINE FRENCH BRIAR**; Given a Rich, Natural, Friction Finish; Solid Rubber Stem; Sterling Silver Mounted With Aluminum Clog Eliminating Shield. Price Including Nickel Plated Pipe Companion $1.00 Postpaid. Or **Write For Free Booklet.**

THE BREECHLOADER PIPE COMPANY, Inc.
SUITE B B, 335 BROADWAY, NEW YORK, N. Y.

Belber
TRAVELING GOODS

For Christmas—a bag or suitcase—a Belber bag or suitcase—made of Du Pont Fabrikoid, Craftsman Quality—fitted complete with a toilet set of beautiful Ivory Py-ra-lin—and doubly guaranteed.

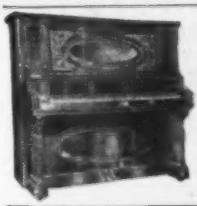
681 F—Black
685 F—Brown
Made in handsome, small cross grain. Fitted as illustrated.
20 inch size - - $12.00
22 inch size - - 13.00
24 inch size - - 14.00

BELBER TRAVELING GOODS + DU PONT FABRIKOID
OUTWEAR TRAVEL — CRAFTSMAN QUALITY

It is the ultimate in Christmas gifts. Nothing could give more lasting pleasure or better convey the Christmas sentiment.

At all good dealers and department stores

THE BELBER TRUNK AND BAG CO.
Turner and Mascher Sts. Philadelphia, Pa.



3 YEARS TO PAY

Meister Piano 30 days' free trial in your own home
$1 A WEEK or $5 A MONTH **Price $210.00**
No cash payment down. No interest—no extras. Piano stool and scarf free.
ROTHSCHILD & COMPANY
Dept. K16 CHICAGO, ILL.

DODGE BROTHERS MOTOR CAR

Drilling Wells is a Year Round Business

Drilling Water Wells is a profitable, healthful, year-round business. There are wells all around you to be drilled. Don't you want to get into a money-making business for yourself? Write for particulars.
STAR DRILLING MACHINE CO.
664 Washington St. AKRON, OHIO

17¢ a day buys a LIBERTY Phonograph

Equal to Any $125 Machine —COSTS LESS THAN HALF

Every family should have a real Phonograph for Christmas. Investigate this wonderful instrument and easy-payment offer.

FULL YEAR TO PAY

THE LIBERTY is 45 inches high—a big, massive, magnificent piece of furniture. Has All Features—Multiple Spring Worm Gear Motor, Speed Regulator, Automatic Stop, Universal Tone Arm, All-Wood Sound Chamber, Individual Record Rack—in fact, every feature of machines costing TWICE as much.

THE LIBERTY plays all records without extra attachments—Victor, Columbia, Edison, Pathe and any other disc record—with a clearness and roundness of tone that the most expensive machines cannot improve upon.

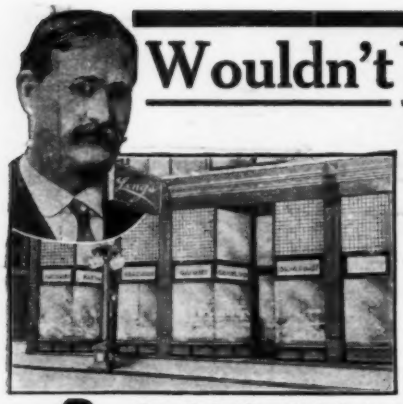
Free Booklet Just send us your name and address at once and get the handsome Liberty Booklet FREE! Address
National Talking Machine Co., 329 N. Second St., St. Louis, Mo.

Net Prices To You!—

Wonderful offer. Get our best net prices on superb diamonds. Rings in all styles of setting, Tiffany, Belcher, etc., brooches, La Vallieres, pins, etc. Splendid diamond clusters in elegant platinum mountings. $2.50 a month and up. And *free examination* first.

Write for illustrated *Diamond Book*, net price list and liberal credit terms. All particulars free. Get this great offer. Write today—now.
Burlington Watch Co., Dept. 1199, Chicago

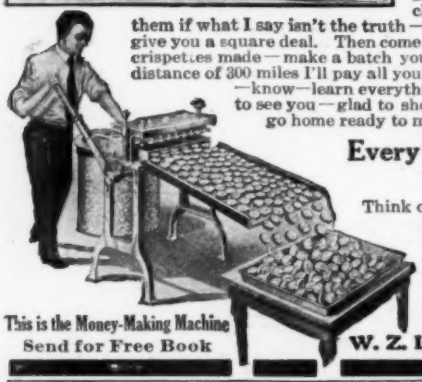
Wouldn't You Like to Own a Store Like This?



Wouldn't you like to be proprietor of a money making business? Once I was just a struggling candy maker. The profits from Crispettes, the new, delicious popcorn confection, built this big business for me. The very same proposition that made me, should do the same for you. Long winter months are ahead. Don't slave them away for someone else. **Start in the Crispette Business for yourself.** Build a business of your own as I did. Get a window—a small store—a cozy nook where the rent is low. Keep **all** the profits. I'll teach you the Crispette business—tell you how to succeed—show you how to make Crispettes by my special secret formula. I'll do it right here in Springfield—personally or by mail. But the thing for you to do is to

Come to See Me at My Expense

Don't say you're coming. Just drop in quietly. Call on any banker or merchant. Ask them about Long—about my store—my crispette business. Ask them if what I say isn't the truth—right from the shoulder. Look into my reputation. See if folks think I'll give you a square deal. Then come and see my store—see that it's just like the picture. See the machine. See crispettes made—make a batch yourself. Learn the business. Get my pointers on how to succeed. Up to a distance of 300 miles I'll pay all your traveling expenses, if you buy a machine. You'll see—know—learn everything. It's simple—easy. Won't take you a day. I'll be glad to see you—glad to show you the store and have a good talk with you. You'll go home ready to make more money than you ever made in your life.



This is the Money-Making Machine
Send for Free Book

Every Nickel You Take in Nets You Almost Four Cents Profit

Think of it! Think of the fortunes made in 5 cent pieces. It's one business in a hundred. Everybody likes crispettes—children—parents—old folks. One sale always means two—two means four. So it goes. It's a great business. I found it so—so should you. **Send for my big free book "How to make money in the Crispette Business"**—48 pages illustrated—complete information and story of how I built my business. Read it and then come to Springfield.

This is a recent picture of the man who made $1500 in one month with a Long Crispette machine, in a store window.

W. Z. LONG, 1377 High Street, SPRINGFIELD, OHIO

WONDER Pipe Bender

Saves the cost and waste of elbow joints. Bends 2" pipe *cold* to 90 degrees in 2 minutes.

Bends steel, iron, brass or copper pipe—without heating, treating, filling, cracking or crimping.

Used by United States, Canadian, French and English Governments.

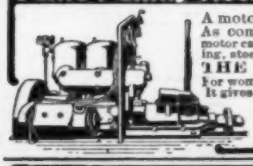
No job too big—no shop too small.

3 SIZES: 1/8" to 1" — 3/8" to 2" — 2 1/2" to 4"

Write for complete catalog.

American Pipe Bending Machine Company
49 Pearl St., Boston, Mass. 009

Caille Family Motor-Electric Starter



A motor for all members of the family. As completely equipped as a modern motor car. Electric starter. Starting, controlling, steering, all in easy reach from one position.

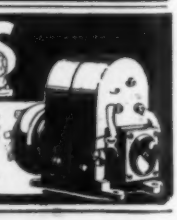
THE DEPENDABLE MOTOR

For women and children this motor is unequaled. It gives constant service. Write for catalog on this motor and our entire line.

Caille Perfection Motor Co.
32 Caille Bldg., Detroit, Mich.

For Ford Cars

The Light that never fails
HENRICKS Electric Lighting Outfits



Perform a double duty; give you brilliant steady light for your car and sure-fire ignition for your engine. Simple, strong, positive. Come ready for work; easy to install; low in price.

Write Today for Booklet

Henricks Magneto & Electric Co.
1202 St. Paul Street, Indianapolis, Indiana

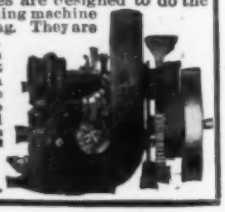
Does Red Meat Cause

RHEUMATISM?

Send now for FREE copy of Dr. R. L. Alsaker's articles published in The Independent, September 15th. Frank E. Morrison, Publisher, 806 St. James Bldg., New York.

THE "LITTLE PET" ENGINE

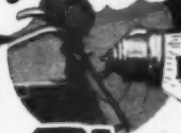
An Ideal Xmas Present.—War may take your men away, but a **"Little Pet"** motor will do much of the work they leave. These little machines are designed to do the home work, from running the washing machine to the cream separator and pumping. They are entirely enclosed, safe and compact. Any woman or child can run them when once set up, and they are silent and cleanly enough to use right in the house. Gas or gasoline can be used for fuel at a cost of from ½ to 1½c per hour when developing full ½ H. P. Every engine is complete with starter and geared countershaft. **You Don't Have to Crank Them.**



Send for Our Booklet "A"

ELGIN GAS MOTOR COMPANY, ELGIN, ILL.

Prest-O-Lite



for Motorcycles

The Light You Need

YOU need Prest-O-Lite to give you pleasure and safety in night riding. No other lighting system is more efficient, dependable or trouble-proof—none more economical.

With your machine equipped with Prest-O-Lite you have a light that is brilliant, steady and reliable. And it is the most economical lighting system you can buy. Its first cost is small and the upkeep expense is practically nothing.

Experienced riders everywhere insist on Prest-O-Lite when buying a new machine. They know it fully meets every lighting need. More motorcycle riders use Prest-O-Lite than all other systems combined.

Easy to Install on Any Machine

No matter what make of machine you have or intend to buy, your dealer can fit you out with Prest-O-Lite. All you need is a style M C Prest-O-Lite gas tank, a good acetylene head-lamp and rubber tubing to connect the two.

On this combination of equipment your dealer can make you an attractive price. See him about it today.

Write for our literature on acetylene lighting systems for indoor and outdoor use. Prest-O-Lite is also the ideal fuel for soldering and brazing.

The Prest-O-Lite Co., Inc.

The World's Largest Makers of Dissolved Acetylene

U. S. Main Office and Factory, 265 Speedway, Indianapolis, Ind.
Canadian General Office, Dept. N-8, Toronto, Can.

Prest-O-Lite Exchange Agencies Everywhere

"The Gas of a Thousand Uses"

Please Mention Popular Mechanics

ANY WATCH YOU WANT on CREDIT

1918 Models

WALTHAM
HAMILTON
ELGIN
SOUTH BEND
Illinois, Howard

Sent on 30 Days Free Trial

No Money Down

Express Prepaid in Advance by Me

You take no chances with me. I am "Square Deal" Miller and I trust the people. That is why I am doing the greatest Credit Watch, Diamond and Jewelry business in the country. Suppose you want any one of the country's best makes of watches? Name any one, I have it for you. No money Down, Express Prepaid. **A full month to carry it in your pocket** and the easiest of Long Time Payments. That's the test that tells. All these watches **GUARANTEED 25 YEARS**

I Smash the Terms

No References Demanded

My terms are made to suit you. You get unlimited credit, with no red tape, notes or collectors. All unnecessary detail left out.

An "Open Charge" Account

the same kind of credit you get from your grocer. No matter where you live or what your income is, you can now own the finest watch, a beautiful diamond or any rare jewelry and never miss the money.

Costly Catalog FREE

Send me your name and address so I can mail you, Free and postpaid, the most beautiful catalog of its kind ever printed. I want you to have this book. It's a gem. It illustrates all makes of valuable **Watches, Elegant Genuine Diamonds,** and a vast assortment of **Beautiful Jewelry,** all on the easiest and most liberal terms

Square Deal MILLER
PRES.
950 Miller Bldg., Detroit, Mich.

BE THRIFTY BUY A DIAMOND PAY MONTHLY

MONEY REFUNDED IF YOU CAN BUY CHEAPER FOR CASH.

SQUARE DEAL MILLER PRES.

Fine Diamonds
Our diamonds are all perfect cut beautiful stones, white in color and lots of fire.

Fine Diamonds
You cannot buy by mail better diamonds at any price than we are selling on credit.

FREE CATALOG COUPON

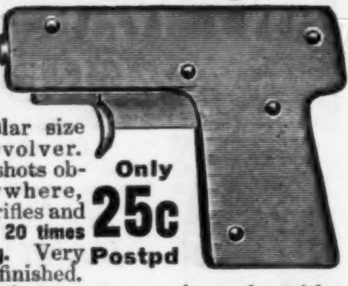
SQUARE DEAL MILLER, Pres.
950 Miller Bldg., Detroit, Mich.

Please send me your 1918 Catalog and explain fully your 30 Day Trial Plan and Easy Terms.

Name.....

Address.....

Automatic Repeating Rifle



Fires 20 Shots in One Loading

This is a regular size automatic revolver. Shoots B. B. shots obtainable anywhere, same as other rifles and guns. **Repeats 20 times with one loading.** Very handsomely finished.

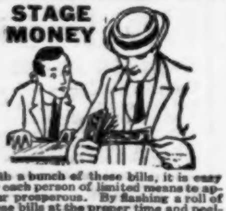
Only 25c Postpd

No caps or load necessary, as it works with a spring and shoots with rapidity and accuracy. Simply load with 20 B. B. shot, then press the trigger. Nothing to explode—absolutely harmless and safe. Remember, it is not a mere toy, but the same size and shape as a REGULAR AUTOMATIC. Sent complete with a round of shot for ONLY **25c** postpaid. **Johnson Smith & Co.**

Sneezing Powder

Place a very small amount of this powder on the back of your hand and blow it into the air, and everyone in the room or car will begin to sneeze without knowing the reason why. It is most amusing to hear their remarks, as they never suspect the real source, but think they have caught it one from the other. Between the laughing and sneezing you yourself will be having the time of your life. For **parties, political meetings, car rides,** or any place at all where there is a gathering of people, it is the **greatest joke out. Price 12c or 3 for 30c.** **JOHNSON SMITH & CO.**

STAGE MONEY



With a bunch of these bills, it is easy for each person of limited means to appear prosperous. By flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 15 Bills 10c, 50 Bills 25c, 125 for 50c, or $3.50 thousand.**

NEW BOOK ON ROPE SPLICING

USEFUL KNOTS, HITCHES, SPLICES, ETC.

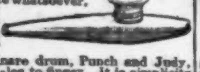
PRICE 20c

How Different Knots Are Made and What They Are Used For. Knots to Use and Knots to Avoid.

A most practical handbook giving complete and simple direction for making all the most useful knots, hitches, rigging, splices, etc. Over 100 illustrations. All about wire rope attachments, lashing, blocks, tackles, etc. 37 Heraldic Knots illustrated. Of great value to mechanics, riggers, campers, boatmen. **Price 20c p. pd.**

Johnson Smith & Co., Dept. 93, 54 W. Lake St., Chicago

MUSICAL KAZOO



With the Musical Kazoo you can, without previous practice whatsoever, play any tune right off, imitate any bird or animal, bagpipe, snare drum, Punch and Judy, etc. No holes to finger. It is simplicity itself. Produces excellent music. You do not blow into it, but sing, speak, laugh or make any desired imitation. Used with astonishing results at society meetings, home, club or church entertainments, dances, serenades, picnics, outings, excursions. Just the thing for choruses and shows, bicycle and marching clubs, etc. Excellent for vocal or instrumental accompaniments, either with or without other musical instruments. **Price 15c p. pd.**

MAGIC FLUTE

Wonderfully Sweet Toned and Musical

Post Paid 15c

A marvelous musical instrument. No other instrument produces sweeter music, whether it be the joyous notes of a quickstep or the solemn strains of a church hymn—in fact, any class of music can be played upon the Humanatone without practice, as it is almost a self-playing instrument. When played with a piano accompaniment, or any other musical instrument, the effect is charming. Full printed instructions for playing sent with each instrument.

JOHNSON SMITH & CO., Dept. 93, 54 W. Lake St., CHICAGO

All the Latest Surprising and Joke Novelties

Pharo's Serpents Eggs, box	10c
Miniature Water Pistol	10c
Cleopatra's Snake (very lifelike)	15c
False Mustache (fool your friends)	6c
Ford Auto Puzzle (Latest)	15c
Magic Flute (anyone can play it)	15c
Rubber Razor (very formidable)	20c
Rubber Dagger (sensational)	20c
Window Smashers (great joke)	25c
Pocket Detective (see behind you)	15c
Great Mind Reading Mystery Cds.	10c
Thurston's Mysterious Trick Cds.	10c
Fighting Roosters, pair	10c
Cover the Spot Trick, a scien. nov.	10c
X Ray Novelty	10c
Trick Pencil	10c
Rubber Tacks (a good joke)	10c
Mesmerized Penny (defies the law of gravitation)	20c
Mysterious Tumbler and Vanishing Coin Trick	25c
Enchanted Bottle (won't lay down)	6c
Magic Plate Lifter	20c
Imitation Gold Teeth	3 for 10c
Great Burglar Puzzle	10c
Wire Puzzles, 10c. 22 different, $1.36	
"Elec-Trick" Push Button	10c
Inkless Pen (writes with water)	10c
Imitation Bed Bugs	10c
Squirt Ring	20c
Trick Bill Book	10c
Glass Revolver	25c
Glass Watch	25c
Multiplying Billiard Ball Trick	25c

JOHNSON SMITH & CO., Dept. 93, 54 W. Lake St., CHICAGO

THE EXPO WATCH CAMERA

The most wonderful and ingenious Camera made

It is but little larger than a watch, which it closely resembles. You can carry the **Expo** about in your pocket and take pictures without any one being the wiser.

One Cent a Picture

The Expo loads in daylight with 25 Exposure Films, costing 25c, thus the picture taking part of a whole day's outing may be had for the nominal sum of 25c—One cent a picture. 10 Exposure Films also obtainable. It is implicity itself to operate. Takes pictures through the stem, where the **Rapid Fire Lens** is located. The photos (5/8 x 7/8) may be enlarged to any size.

Price $2.50

QUICK AS A FLASH Time and **instantaneous** shutters; weighs but 3 ounces; nickel plated. Endorsed by **amateurs and** professionals the world over. Thoroughly practical—printing and developing of films just the **same as ordinary cameras**—in daily use by the police, newspaper reporters, detectives, and the **general public**. Important beats have been secured with the Watch Camera by enterprising reporters. Produces clear, sharp negatives indoors or outdoors **equal to any camera** on the market, size or price notwithstanding.

Expo Watch Camera $2.50 Postage 10c Anywhere

FILMS, 10 Exposures 15c, 25 Exposures, 25c
Leather Pocket Carrying Case, 35c

JOHNSON SMITH & CO., Dept. 93, 54 W. Lake St., CHICAGO

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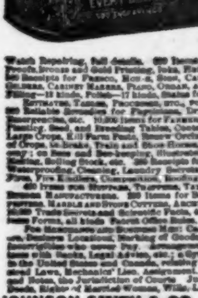

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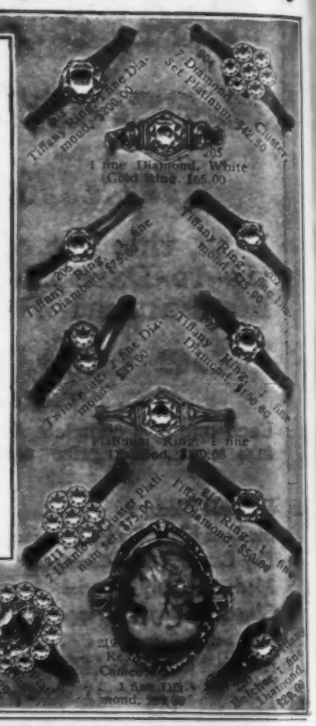

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No. 5. Solid gold open circle design. 1-2 K. Tifnite Gem. Price $12.50. $3.50 on arrival. Balance $3.00 a month.

Send No Money

Neither money nor references. Just the coupon brings wonderful Tifnite Gem mounted in solid gold. For size cut a strip of heavy paper so that ends exactly meet when drawn tightly around second joint of finger on which you wish to wear ring. Don't let it overlap. Send this with coupon. Send now and take advantage of this liberal free trial offer. Satisfy yourself about these dazzling gems.

THE TIFNITE GEM CO.
Rand McNally Bldg., Dept. 289, Chicago

Send me..... No..... on 10 Days' approval. If satisfactory, I agree to pay $3.50 on arrival and balance at rate of $3.00 per month. If not satisfactory, I will return same within 10 days.

Name .....

Address .....

Please Mention Popular Mechanics

A

Kodak or Camera

is the Most Desirable and Useful of

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Our Prices are the Very Lowest

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As there is a great shortage of all Photographic Goods, we suggest to

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while our stock is complete. If you do not want your selection forwarded at once, we will gladly place same in reserve until you submit further instructions for shipment. All Cameras and Kodaks **sent prepaid** and packed in **Holly Boxes.** A lot of people are going to be disappointed. We hope you won't be one of them. Therefore we again repeat

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No. 0 Anco Vest Pocket Camera takes pictures 1⅝x2½, fitted with a high grade Achromatic Lens and Shutter of various speeds. Very light and compact.

$6.75 Same Camera equipped with an f:7.5 Anastigmat Lens and Actus Shutter.....$14.40

No. 2 Anco Vest Pocket Camera takes pictures 2¼x3¼ fitted with a high grade Anastigmat Lens working at f:7.5 and extra Speed Bionic Shutter working from 10th to 200th part of a second. Can easily be carried in hip pocket.

$16.50 Same Camera equipped with the f:6.3 Lens.....$24.50

3A Kodak Eastman Autographic. This is the most popular machine on the market. Takes full Post Card size pictures. Equipped with a first-class RR Lens, Kodak Ball Bearing Shutter. Cable Release covered with fine grain leather. The most compact Kodak for the size picture it takes.

$19.95 Same Kodak with f:7.7 Anastigmat Lens..... $24.25

2A Hawkeye. This Camera takes pictures 2¼x4¼, fitted with a good grade of Achromatic Lens and Shutter for time and instantaneous exposures. Covered with imitation leather, leather handle. This is the most wonderful camera for the price.

$3.15 Same Camera in postal card size.....$4.95

These **Cameras** and **Kodaks** use the standard roll films, and are just a few of our Bargains. We carry a complete line of all standard makes of Cameras, Kodaks, Lenses and supplies of every description.

Send for our free Bargain Book and Catalog

the most complete in America

listing hundreds of new cameras at extraordinary low prices.

SPECIAL

For those that are not particular about a brand new outfit we have a large assortment of used machines from **Vest Pocket to Graflex,** which we are offering at remarkable saving prices. Therefore, **don't delay** sending for your copy now. Compare our prices with others and we know you will be numbered amongst our thousands of satisfied customers. Every item sold on our

10 Day Free Trial Guarantee or Money Back in Full if Unsatisfactory

Established in the photographic business for the past 18 years. If you are in doubt about making a selection, do not hesitate to consult our expert service department regardless of whether you purchase or not.

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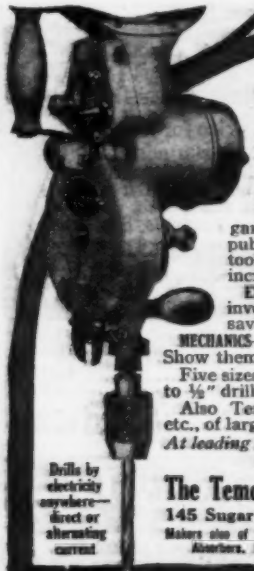

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Pays Its Way Every Day

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Also Temco Drills, Grinders, Buffers, etc., of larger capacity.

At leading Dealers and Jobbers Everywhere. Write for our catalog.

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Makers also of TEMCO-Alfa Shock Absorbers and TEMCO Shock Absorbers, Master Vibrators and Lock Switches for Fords.

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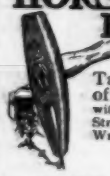
ROBERTSON HORSESHOE MAGNET HAMMERS



The Hammer Holds the Tack

Tacks or small nails are held by magnet end of hammer, so you can drive them anywhere within reach. A handy tack hammer for home or workroom. Strong, permanent magnet; warranted fine steel. Price 50c. Write for price list of other special purpose hammers.

At your hardware dealer, or mailed postpaid, for 50c, coin or stamps.

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INDOOR CLOSET

More Comfortable, Healthful and Convenient than the Out-Door Closet

Eliminates the out-door closet and open vault. They are breeding places for germs. Have a warm, sanitary, odorless toilet right in your house. No going out in cold weather. A boon to invalids. Endorsed by State Boards of Health.

W. M. Davis writes: "Your indoor closet is giving absolute satisfaction. It is certainly the thing for a home without sewerage."

Absolutely Odorless

Put It Anywhere in the House

The germs are killed by a chemical process in water in the container, which you empty once a month. **Absolutely no odor.** No more trouble to empty than dishwater. Dust sanitary guarantee. Write for full description and price.

Agents Wanted — Big Profits Wonderful opportunities in every town, village and in the country. Best season just at hand. Every home is a good prospect. Sell eight out of every ten you call on. Ernest Bidwell writes, "Have ten orders." G. A. Dinsman says: "Ship at once twenty closets and fifteen washstands. Sold them all in one community." Sells itself. Everybody hates the outdoor closet. Everybody wants a **Ro-San Indoor Closet.** Write quick for territory and full particulars. We are prepared to ship promptly any quantity of closets—no waiting.

ROWE SANITARY MFG. CO., 12812 G St., Detroit, Mich.
Ask about the Ro-San Washstand—Hot and Cold Running Water Without Plumbing

Send for it Now

A PREPAREDNESS GIFT

Huntsman Sporting Knife and Pistol

Combined Hunting Knife and .22 Caliber Pistol for the boys who are away—and those who are "doing their bit" at home.

NOT A TOY

Size 3⅞ inches long, 1 inch wide

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Article II reads: "A well regulated militia being necessary to the security of a Free State, the right of the people to keep and bear arms shall not be infringed."

The "HUNTSMAN" is for the outdoor man or woman—also a protection for every home. Discharges the standard .22 caliber long cartridge as effectively as any pistol. Automatic safety makes it absolutely without danger to user. High class workmanship—large, keen blade made of best cutlery steel—finished in nickel—handsome in appearance—put up in fine chamois skin pouch with button fastener and packed in neat box.

Price $5, postage prepaid

Send cash or money order

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Positive—Pleasing—Penetrating

Wonderful improvement in warning devices. Surer. Safer. Most economical. So superior to other styles—now standard equipment on many leading cars. Operated directly by explosion through priming cup—opening in cylinder. Not an exhaust whistle. Vastly better. Easily installed. Never fails. Clear, sweet-toned warning note cuts through noisiest traffic confusion. Guaranteed for life. Sold on Trial. Low first cost only cost. Write quick for circular, big money-making proposition for agents and dealers—ask for it.

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Pay as You Wish

We'll send you a genuine Lachnite for you to wear for 10 full days. If you can tell it from a real diamond send it back at our expense. Costs but 1/30 as much. If you decide to keep it pay only a few cents a day. Write for catalog.

Genuine Lachnite Gems

keep their dazzling fire forever. Set in solid gold. Outlay world renowned diamond cutters. Will stand fire and acid tests. All kinds of jewelry at astounding low prices. Easy payments. WRITE TODAY.

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FITS ANY FAUCET

Give This Practical Gift of Lasting Pleasure

KNICKERBOCKER Bath Spray-Brush

Shower-Massage-Shampoo-Rub-Down-ALL IN ONE

Enjoy the Delights of a REAL Tonic Bath

You'll feel renewed—*different* than after any other bath you've ever had. Hundreds of hollow rubber teeth massage and cleanse the impurities from every pore. Stimulates circulation. Invigorates. Makes your whole body glow. You bathe in fresh running water—any temperature desired—the only sanitary way. **Great for children—and everybody.** It's fun, health and cleanliness. For **shampooing** the Spray-Brush is unexcelled. Its staunch, flexible teeth penetrate the heaviest hair, massage the scalp, and clean, flow my water washes away all soap, dirt and dandruff. **It's quick—no tub to fill.** Fits hand—flexible to body. **Wear fully guaranteed. Lasts for years.**

$1.75, $2.50, $3.50, $5 — De Luxe Set $8

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Russel

Internal Gear Drive Axle

The most serviceable and economical motor truck axle made. Write for convincing reasons why your truck should be equipped with the Russel Axle.

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For Boys and Girls

The Ideal and Practical Christmas Present

Father, that boy will jump out of his skin with joy if you give him an **American Junior** Auto for Christmas. Boys—get dad interested. Tell him the many ways you can help pay for it, running errands, delivering bundles, messages, etc. Say to him, "Dad, you get the machine and I'll turn in my earnings and pay you back as much as you say. I'll take you to work in the morning and get you at night."

American Junior Automobiles

are just the thing for boys and girls from 12 to 18. **American Junior**, shown above, propelled by motor wheel attached in rear. Simple and safe. No complicated parts. **Price $175.00. American Flyer No. 2,** shown at right, is the cheapest and best motor propelled vehicle of its kind ever produced. Climbs hill like the big fellows—has a speed up to forty miles per hour, makes from forty to fifty miles per gallon of gasoline. **Price $200.00.** Two cylinder, four cycle opposed type engine with magneto and carburetor. The slickest thing you ever saw. Simple in construction—easily started from the seat—oiled by splash system—develops maximum power on minimum amount of gasoline. Four horse power, brake test, ample to propel car with two passengers over any ordinary road.

American Motor Vehicle Company, Lafayette, Ind.

Write today for free catalog and full description

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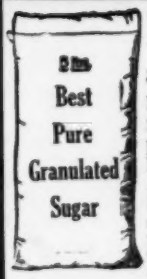

MAIL order houses waste thousands of dollars daily, sending expensive catalogs to people that don't mean business. We eliminate this waste and sell for less by sending our catalogs only to people that prove their sincerity by taking advantage of the big saving offered in the following trial assortment.

HERE is your opportunity to become a customer of a Real Wholesale Grocery that can save you big money on groceries every day in the year. Indications point to unheard of high prices on all lines for the winter months. Our customers can be protected. Send your trial order and get our catalog. It's brim full of bargains that you need and want. Get it today and lay in a supply for the winter.

***NOTE!* We reserve the right to limit each customer to only two assortment orders**

GUARANTEE Each and every item we sell is guaranteed to be exactly as represented—the best that money can buy. You cannot buy the same quality of goods at such low prices from any other firm on earth. However, should you be in any way dissatisfied simply return the entire shipment and get your money back. We guarantee that you will never lose a penny in your dealings with us.

DON'T FORGET We send our catalog only to those who buy this special assortment. We do not sell a part of the order or any item in it separately, but our Big Bargain Catalog contains hundreds and hundreds of these great bargains which you are privileged to buy in any amount you want. Get this catalog and save money. Send your trial order today. Simply enclose money order or check for $2.99 and say "Send assortment number E-89."

BEST PATENT FAMILY FLOUR 196 LB. BBL. $8.50

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Money Back If You Are Not More Than Pleased

GROCERY ASSORTMENT No. E-89

Approximate Retail Price		Our Wholesale Price to you
	Approximate Weight, 19 lbs.	
$0.50—	5 lbs. Best Pure Granulated Sugar	$0.20
.12—	1 Large Size Package of Quaker Oats	.06
.08—	1 Package Uneeda Biscuits	.02
.08—	1 Bar Ivory Toilet Soap	.03
.15—	1 Can Campbell's Tomato Soup	.08
.07—	1 Bar Kirk's Flake White Laundry Soap	.02
.07—	1 Bar American Family Soap	.02
.25—	1 Can Sardines, French Style	.14
.90—	2 lbs. Moneyworth Brand Coffee	.70
.80—	1 lb. Tea, highest grade, uncolored Japan	.57
.50—	1 lb. Guaranteed Baking Powder	.39
.39—	1 Bottle Concentrated Bluing	.23
.60—	1 lb. Pure Breakfast Cocoa	.33
.50—	¼ lb. Pure Ground Cinnamon	.20

$5.01— **Our Special Catalog Free!**

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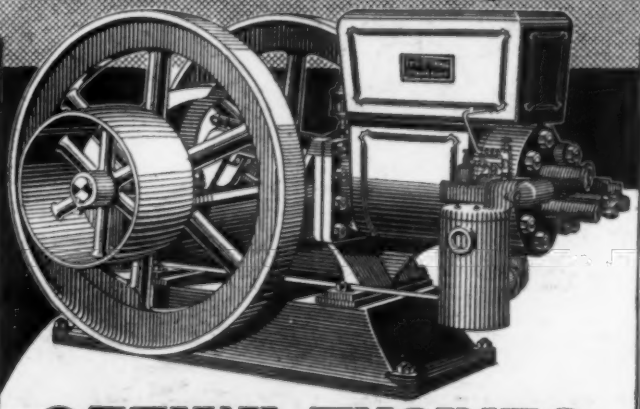
NOTE:—The above firm is reliable. Send them your order. Independent State Bank, Chicago

Let Me Ship You An Engine To Earn Its Own Cost While You Pay For It!

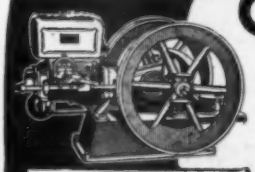
Notwithstanding the wartime high prices of iron and steel, and engine materials, I am still shipping **Ottawa Engines** for low prices. My factory has large stocks of materials, and plenty of engines. I make prompt shipments besides saving you money in the price.
GEO. E. LONG



Kerosene Engines

Kerosene is the economical engine fuel now. While gasoline may go still higher, kerosene oil will continue to be cheap, because of the great proportion more of Kerosene made while forcing the production of gasoline for the great needs of the war. Get an OTTAWA Kerosene Oil Engine and have continuous reliable power for the future, and at less than one-third the cost of gasoline.

OTTAWA ENGINES



The Ottawa gasoline engine on iron subbase equipped with magnets requiring no batteries

Thousands of men all over this country, in shops, elevators, mills, factories, and on farms, have made my engine pay for itself while they used it. My money-saving terms of purchase make it easier to own an engine than to be without one. Having the largest number of sizes to choose from, you can find a size of engine just suited to your work, and you have your choice of the fuel, for my engines use

Kerosene Oil, Gasoline, Distillate, and Gas

My kerosene oil engine is easy to start and as easy to operate as any gasoline engine. With it, you get more power from a gallon of 6 or 8-cent kerosene, than you can get from a gallon of 20 or 25-cent gasoline in any gasoline engine. All sizes are easy to start, easy to understand and manage, and with my lower prices and fuel saving engines, you get the greatest amount of dependable power for years to come, for the small amount of money you put into your engine.

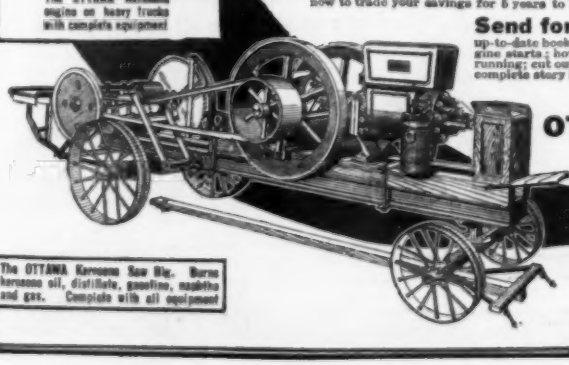
90 Days' Trial — 10 Year Guarantee

You have 90 days in which to try my engine at your own work. I have always given my customers this right. Years ago I was the only engine manufacturer selling direct from my factory and the only one who sent every engine out on trial. You take no chances in selecting an Ottawa engine.

Cash or Easy Terms

My money saving plan of selling makes it easy for you to own an OTTAWA engine, on terms by which the engine cost can be paid for by the earnings of the engine. No need now to trade your savings for 5 years to own a good engine.

The OTTAWA Kerosene engine on heavy trucks with complete equipment



The OTTAWA Kerosene Saw Rig. Burns kerosene oil, distillate, gasoline, naphtha and gas. Complete with all equipment

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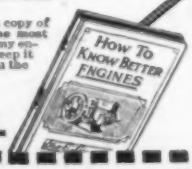
You should have a copy of my new book — the most up-to-date book on engine building. Explains how easy my engine starts; how little it costs to operate; how easy to keep it running; cut out coupon and mail to-day and I will tell you the complete story by return mail.



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Make home defence a reality by giving the man of the house a *safe* revolver for Christmas. The gift of an Iver Johnson Revolver is a gift of complete protection for your family.

The Iver Johnson is the perfect weapon for home defence. It gets off the first shot because there is nothing to do but pull the trigger—no complicated safety buttons or levers to adjust—or forget. There is nothing to fear from an Iver Johnson for the man who owns one. It is the safe small firearm—you can "Hammer the Hammer." It is accident-proof.

At all sporting goods and hardware stores. Or send for FREE Booklet "A" telling all about Iver Johnson Revolvers and Shotguns.

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Hammer Model with "Perfect" Rubber Grip, $8.75

Hammerless Model with Regular Grip, $8.75

Hammer Model with "Western" Walnut Grip, $9.25

LAST Chance

to get the

Genuine New Edison

at the

Old Price

Here's your chance, and it's the last one. The very last announcement that will be made in this paper before the big increase in price of the New Edison.

Orders for the increase have come from Mr. Edison himself. High costs of materials and labor have made it necessary. Mr. Edison regrets the necessity of this price raise but conditions make it essential. So, if you want a New Edison now is the time to get it. Don't put it off.

Still Only

$1.00 after free trial

Yes, we will send you the New Edison, the product of the world's greatest inventor's genius, the phonograph with the wonderful diamond stylus reproducer and your choice of the latest Diamond Amberol Records on *free trial without a penny down.* On this offer, you can have the genuine Edison, the instrument which gives you real, life-like music, the finest and best of all phonographs at a small fraction of the price asked for imitations of Mr. Edison's great instrument. *Seize this opportunity.* Send the coupon now for free catalog.

Rock-Bottom Offer Direct

If, after the free trial, you decide to keep Mr. Edison's superb new instrument, send us only $1. Pay the balance on the easiest kind of monthly payments.

Think of it—a $1 payment, and a few dollars a month to get this wonderful new style outfit—Mr. Edison's great phonograph with the Diamond Stylus reproducer, all the musical results of the highest price outfits—the same Diamond Amberol Records—yes, the greatest value for $1 down, balance on easiest monthly terms. Convince yourself—free trial first! No money down; no C.O.D., not one cent to pay unless you choose to keep the instrument.

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Thousands of people are going to lose out on this offer unless you hurry—hurry. Don't fail to let me send you the Edison Catalog giving you all the details of the big price increase. You will have just time now, and no more than time, to let me tell about the big opportunity you have and get your order in. So "make hay while the sun shines" and rush in coupon. There is absolutely no reason why you shouldn't save this money. You will always blame yourself if you do not. So mail the coupon now. This isn't a matter which can be put off. Remember, **now or never.**

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To **F. K. BABSON**
Edison Phonograph Distributors
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Gentlemen: Please send me your New Edison Catalog and full particulars of your free trial offer on the new model Edison Phonograph.

Name .....

Address .....

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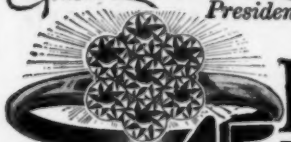
President

$45 At Barnard & Co. Diamond Headquarters



The Barnard $45 7 Diamond Solitaire

(trade mark registered) the size of a 1 carat diamond. Finest Blue White Wesselton **absolutely perfect** diamonds. Set in platinum to resemble a beautiful solitaire. Retail value $75. Barnard import price, only **$45.00**
Men's Mounting $3.00 Extra.

14K Solid Gold
1-4C Steel Blue White **$30.00**
3-8C Extra Blue White **$41.50**
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14K Solid Gold
1-3C Wesselton Blue White **$79.50**
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3-8C Extra Blue White **$80.00**

14K carved rose finish ring.
3-8C Blue White Diamond **$35.88**
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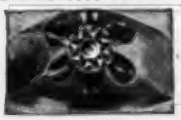

14K Solid Gold Ring.
5-8C Steel Blue White Diam'd. **$109.88**
3-4C Rare Steel Blue Diamond. **$172.50**

$88 Per Carat. Blue White, perfect cutting, good brilliancy. Worth $150 per carat.
1-4 C $15.50
1-2 C 40.25
3-4 C 64.25

$133 Per Carat. Extra Blue White, perfect cutting, extra brilliancy. Worth $200 per C.
1-4 C $22.50
1-2 C 59.00
3-4 C 96.00

$177 Per Carat. Wesselton Steel Blue White, perfect cutting. Sight perfect.
1-4 C $27.00
1-2 C 77.00
3-4 C 128.00

$233 Per Carat. Roberts Victor Steel Blue, perfect cutting, first quality eye perfect.
1-4 C $39.00
1-2 C 99.00
3-4 C 165.00

$288 Per Carat. Rare Jagersfontein Violet Blue, absolutely perfect and better than first quality.
1-4 C $42.00
1-2 C 119.00
3-4 C 206.00

Yes, only $45 brings either the splendid Solitaire or the exquisite cluster ring. Or you can choose from hundreds of amazing values in other superb diamonds. These offers made possible because I import from European cutters and sell direct to you. No middlemen to pay. A positive saving of 35 per cent on retailers' prices or you can send the diamond back. Judge for yourself before you buy. Free examination of any diamond you select. Be sure to get my De Luxe Book of Diamond Bargains now. Select Christmas gifts from my wonderful collection.

Fine Italian Coral Cameo in hand made dinner ring. 1 fine Diamond. $20 quality and value. Barnard price. **$10.88**

Send No Money!

Merely send for my beautiful Diamond Book—select the diamond and mounting of your choice, and I'll ship it for your inspection—at my expense and without obligating you to buy. As we get all our business in this way our success **proves our prices lowest by comparison.**

Bankable Money Back Guarantee

The only bankable Money Back Guarantee in the diamond business. You can take it to any bank and cash in on your diamond investment if you want to. The only guarantee without red tape, delays or evasions. It is also a legal certificate of carat weight, quality and value of the diamond. Allows you to exchange it at **full value** at any time.

Solid Gold Necklace, brand new and stylish. 15-inch chain. 5 fine quality Blue White Diamonds. Very fine design and workmanship. $40 value. Barnard price **$24.88**

1918 De Luxe Book of DIAMONDS FREE

Profusely illustrated in colors. Shows thousands of the greatest bargains in diamonds. Tells you all about diamond qualities, colors, imperfections. Shows every fashionable and popular style of mounting in 14K solid gold and platinum at **actual factory cost.** Also all sizes of diamonds in **7 different qualities** at import prices. Free for the asking.

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Keep the Home Fires Burning

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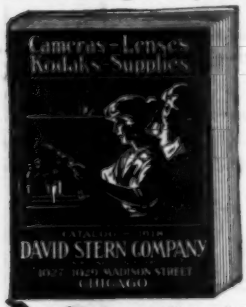

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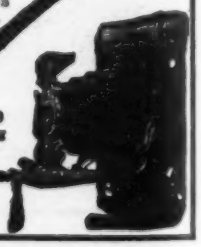

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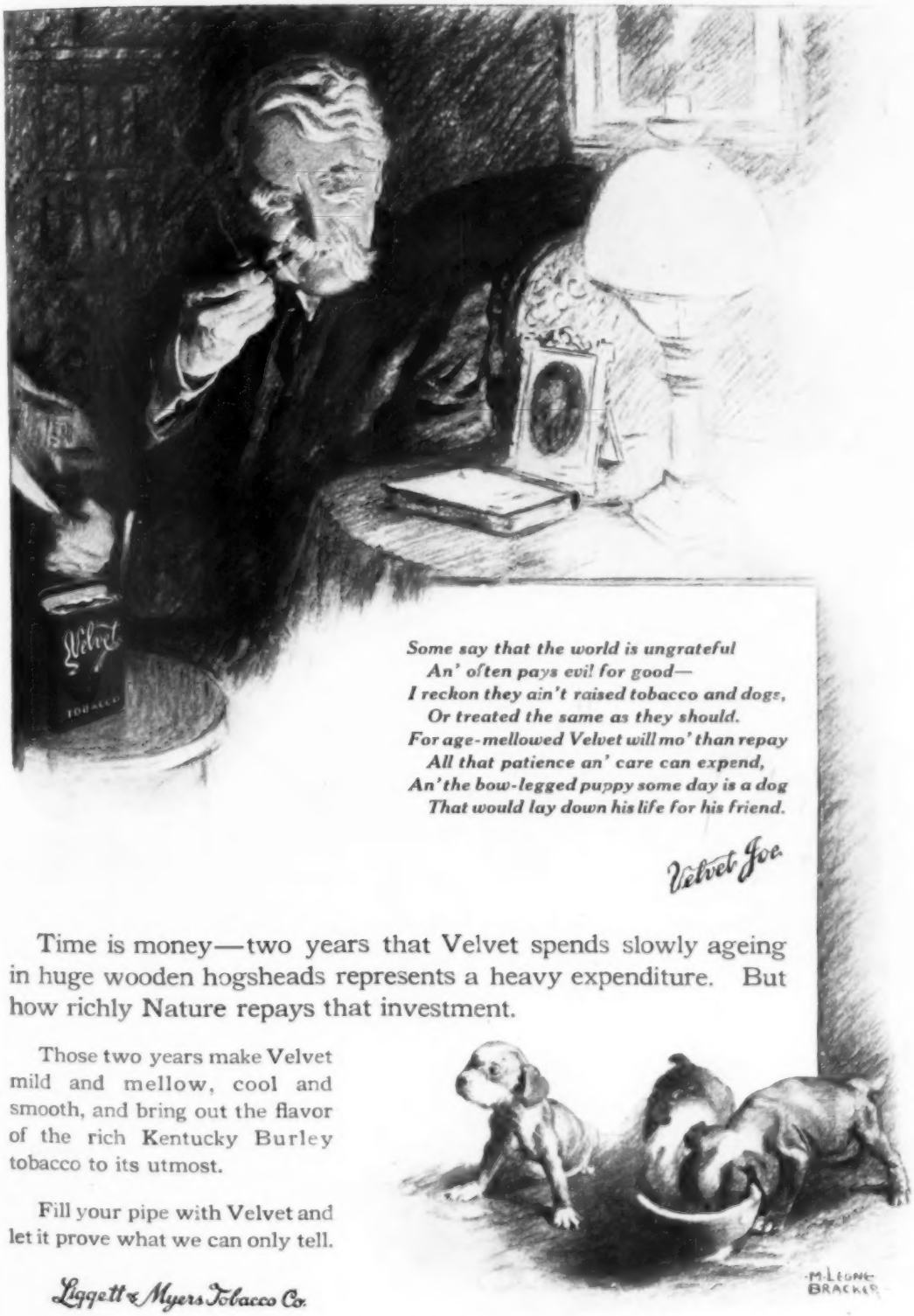

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